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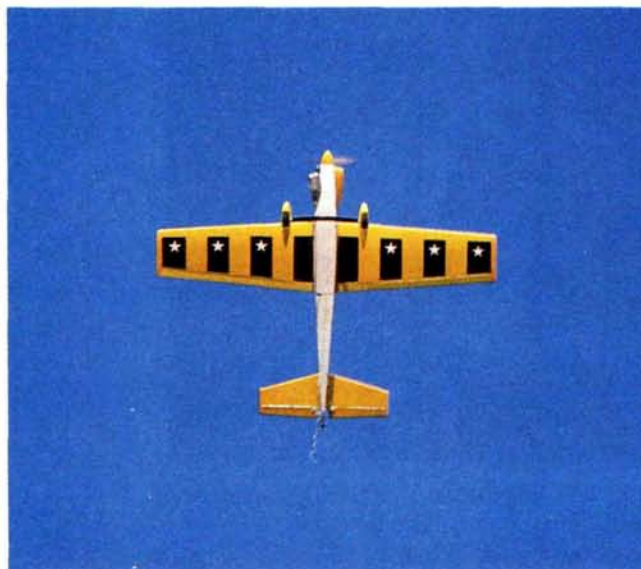
**Hirobo Electric
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**HOW TO:
Laminate Curved
Wing Tips**

**Solution:
THROTTLING
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MODEL AIRPLANE



ON THE COVER:

The swift little navy and gold Cassutt racer flown by then-owner Carl Pascarell moves in tight to Budd Davisson's lens. The Cassutt typifies the breed of diminutive Formula I Reno racers—the aerial hot-rods that you literally wear. Our EZ Formula Racer "Field and Bench" reviews this new kit, which lets you duplicate the action at your own flying field with your own flying buddies. Kodachrome by Budd Davisson.

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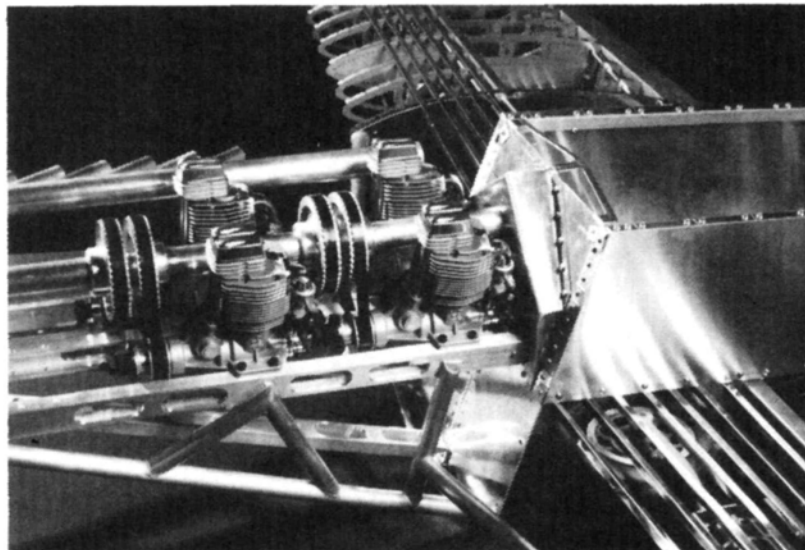
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Editorial

by RICH URAVITCH



HERE IT IS, only the beginning of March, and I've already attended two trade shows at opposite ends of the country. The first of the season was in White Plains, NY, sponsored by the WRAM club of Westchester County. I always look forward to this event because, as an Easterner, I'm immediately put in the "think spring" mode. I entertain thoughts of being at the field in shirtsleeves, flying that brand-new airplane that I've toiled over during the cold, dark, winter months. (Incidentally, this thought process isn't at all impacted by the fact that I'm doing this thinking while fighting my way through a blizzard!) A lot of East Coast modelers seem to feel much the same way. The WRAM show this year seemed to be better attended than previous editions, and it provided the opportunity to renew some old acquaintances and to get a look at what the manufacturers and suppliers of our sport are doing.

By anyone's measure, our numbers are growing, but is this growth regional? Not on your life, bunk! After a two-day R&R back at the office, I headed for the West Coast (specifically, Pomona, CA) to the first RCHTA (Radio Control Hobby Trade Association) show held in that part of the country. Guess what? The reaction of the modelers there was exactly the same: excitement! About the only difference was that the Californian dudes were wearing jams, tees and sunglasses, while the East Coasters were bundled in flannels, parkas and ski masks. A modeler is a modeler is a modeler!

These trade shows offer the opportunity to see, touch, feel and discuss all the latest and greatest goodies in our sport. That's important. It also gives the modeler the chance to voice his praise or complaints to the manufacturers. That might be even more important, because it frequently has a direct impact on the course of action a manufacturer takes. It provides the means for all of us to make our views known directly, and this is ultimately more effective than letters or phone calls. Try to attend these shows, and make your views known. Your opinion does count!

Just a quick update on the all-metal, 1/4-scale P-51 kit project I wrote about in the November '88 Editorial. I just received some new photos from the manufacturer, Warbirds (122 Naubuc Ave., Glastonbury, CT 06033), and I have to conclude that this is an even more ambitious project than I originally figured—but it's still happening! Powerplant installation now consists of four O.S. 120s driving through a cog-belt system, with room for two more if needed! Flight testing is scheduled to begin shortly. We'll keep you posted. ■

MODEL AIRPLANE NEWS

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Airwaves

MAN Makes Miniscule Mistake

Thumbing through the March '89 issue, I noticed a photo of a tool-path being generated on a CAM (computer-aided manufacturing) system (page 42). This immediately drew my attention. Page 44 revealed a photo of what was apparently a vertical machining center and a caption. Randy Randolph proclaims that CNC (Computer Numerical Control) machine tools are capable of machining parts to .0001 inch and even to .00005 inch. *This is an erroneous claim!*

As a professional sales engineer in the machine-tool business and as the holder of a journeyman machinist card with extensive CNC experience, I must protest. There's no way that these machines can hold the tolerances that your columnist

claims. CNC machine tools typically work to under .0005 inch, but not .0001 or .00005 inch as your columnist proclaims. A ball screw will nominally change in length by .0003 inch for every 1 degree change in temperature. A ball screw drives the slides on these machines.

If you don't believe what I'm saying, I'd be glad to refer you to other experts in the machine-tool industry. I feel you should make a correction and vow not to get involved in the machine-tool industry, even as it relates to the model-engine business.

TERRY MOORE
Hendersonville, TN

Thanks, Terry, for the correction. We do try our best to provide what we believe to

be technically accurate information, but we occasionally slip up. We appreciate input from qualified experts such as yourself, and, by the way, we all enjoy your helicopter column in "R/C Report."

RAU

We received the following announcement from our old friend, Joe Beshar, and thought you might like to know about it.

Look Here! Free Radio—Free Awards for your Club

During 1989, Airtronics is offering free awards for your club's contests and competitions. Simply write to: Airtronics, Inc., 11 Autry, Irvine, CA 92718, and request the Lee Renaud Memorial Awards. De

Thirteen reasons why other have trouble sleeping.



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WHERE TO WRITE TO US

If you're writing to the editors (and we'd love to hear from you), please be sure to address your letters to "Airwaves" *Model Airplane News*, 251 Danbury Road, Wilton, CT 06897. Only subscription orders and inquiries are handled by our Customer Service Department in Mount Morris, IL; other mail addressed there must be forwarded to Connecticut, and this leads to long delays.

scribe the activity and when it will take place, and you'll receive 1st-, 2nd- and 3rd-place Olympic-type necklace medals at no charge. These might be awarded as a separate event, or in combination with other prizes. Upon completion, send the winner's name, address and phone number to: Joe Beshar, 198 Merritt Dr., Oradell, NJ 07649, and the winner will be entered in a sweepstake drawing and given the opportunity to win a complete Airtronics radio in memoriam to Lee Renaud, founder of Airtronics, Inc.

Heli Hopeful

I've just started reading your magazine and find it truly well-written and very informative. For some time now, I've been a passenger in helicopters, but I'm

unable to fly them and would love to. To fill the flying void in my life, I've become very interested in building a R/C scale-model helicopter.

I've just ordered your book, "Basics of Radio-Control Helicopters," and a few back issues of your magazine that contain helicopter articles. I truly enjoy reading your magazine from cover to cover, but I was wondering if you publish other magazines that are devoted entirely to R/C helicopters? Since I'm new to R/C models, and particularly to helicopters, I could use just about any help to get started flying.

Keep up the good work with this really great magazine.

RALPH W. WILDERMUTH
APO New York

Ralph: Boy, do we enjoy receiving letters like yours! Thanks for the nice words; we're glad you're enjoying both MAN and our heli book. You'll surely enjoy what's in store: In the very near future, we'll be adding a complete helicopter section to the existing MAN. We've spoken to virtually all the manufacturers, to many of the recognized writers and to lots of heli fliers, and they're all very supportive of the idea. We recognize the need to have material for you heli fans and are prepared to let the new section "grow" to whatever level the readers would like. That also means we'd welcome material on heli activities, products and techniques from contributors. Again, thanks, and stick with us.

RAU

(Continued on page 10)

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Airwaves

Look Out, Hanno!!

Your March '89 cover asks: "Who's the best R/C flier in the world?" I am!

STEVEN A. GLAVIANO
New Orleans, LA

There you go folks, from the home of the Mardi Gras!
RAU

Vintage Radio

My father, who has been into R/C planes for many years, has several older models and even older radios. He has two Controaire radios on frequencies 27.095 and 26.995. Can these sets be updated, and will they be allowed under the 1991 guidelines?

He hasn't flown for several years, but is gaining interest in the sport again.

MARK J. OLANCE
Haslett, MI

Mark, I doubt that your dad's Controaire equipment could be economically, if at all, updated to 1991 specs. An alternative might be to try to sell it to a collector to offset some of the cost of a modern system. Glad to hear your dad is once again becoming interested in R/C. Help him out. Dads are great and we owe them.

RAU

Webra Spare Parts Problem

I've enjoyed your magazine for the last few years. It's worth a million—at least for modelers like me in such a remote area. I read practically every word each month, and I'd like to ask a favor, since it's a task to do modeling in Pakistan where there are no hobby shops.

I managed to import one Webra 60 a few years ago, but I damaged the head of this engine in a bad crash, and I just can't find any address of Webra in your magazine or anywhere else. Could you please send me the address of Webra in Germany or of any big stockist in the States so I can order the spares for my engine? The exact model is Webra 61 RC Brown head.

Once again, please convey my gratitude to all your team who are doing an

excellent job.

KHALID FAROOQ KHAN
House NO 10, Str. 35
F 7/1 Islamabad, Pakistan

Mr. Khan, Webra Engines are distributed in the USA by Hobby Dynamics (4105 Fieldstone, Champaign, IL 61821.) They're manufactured in Berlin, West Germany.

We're printing your complete address, hoping that some of our readers may have the part you require, and perhaps one would send it to you directly. After all, RC is international and this represents an opportunity to keep a fellow R/Cer airborne.

RAU

Wanted: Miniature Naval Aviator

Over the years, I've admired many scale planes in your magazine. I'm now building a 1/8-scale or .60-size Royal F4U Corsair and have seen many planes with pilot figures in them. I'd like a WW II Navy pilot to put in mine. In my area, I'm unable to find a full-body pilot in this scale size. The hobby shops I've called all tell me that they're no longer available. I've written to MGA and DGA, only to find that they're too large or unavailable. Tower Hobbies had a 60-size pilot by RAM, but it's unavailable also. This one was listed as full-body 60 size.

Hoping you can help, I thank you.

JOSEPH E. CROSSAN
Thorndale, PA

Joe, you've pretty much checked all the sources that we can think of. A while ago, however, IM of Japan produced a full-body WW II-type pilot in two scales. They were distributed by World Engines, but I believe all the remaining stock was acquired by Jet Hangar Hobbies (12130 G Corson Street, Hawaiian Gardens, CA 90716). You might give them a try.

RAU

(Continued on page 12)

More Fun. Less Funds!



ESCAPE

SPECIFICATIONS:

Wing Span 62½ inches
Wing Area 770 square inches
Engine Size 10 cc
90 or 120 four stroke

Designed for AMA for the FAI Turn-around pattern. Foam wing and stab with 3-32 Balsa sheet covering. Tricycle or conventional gear, fixed or retracts. Rear or side exhaust, fiber glass canopy. Very positive and maneuverable.



XLT

SPECIFICATIONS:

Wing Span 65 inches
Length 65 inches
Wing Area 845 square inches
Recommended Engine Size 10 cc
90, or 120 four stroke

The XLT is designed for tuned pipe and retract landing gears. Capable of the A.M.A. or Turn-around pattern. Rear or side exhaust.



UTTER CHAOS

SPECIFICATIONS:

Wing Span 63¾ inches
Wing Area 700 square inches
Engine Size .50-.60 (Glow)
.90 four stroke

For fun, sport, pattern, or turn-around, all of these can be done with the Utter Chaos' completely built up Balsa construction. Canopy and engine mount included. Many years of proven flying reliability.

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Airwaves

(Continued from page 10)

Help Wanted

First, let me say your '89 *Airplane Annual* was great! I really enjoyed "Scale Tips" by Rich Uravitch. I've built a number of kits, e.g., Goldberg Skytiger, Sig Clipped Wing Club, etc., and I've enjoyed every hour building and flying them. With each plane I've built, I've stayed within the engine size range. My next kit is the Top Flite P-51B that calls for engine size 40-60, and I'd like to stay at the top of the scale. Engine sizes seem to go 40 to 45 then up to 61 with few between 45 and 61.

After looking at engine prices, I think a 65 K&B Sportster is a good buy, but would I be making a big mistake putting that engine in a plane this size? In what areas would this cause problems: weight, prop size, wing loading, etc.? I'm sure I must have missed the MAN edition that addressed this area, so please help!

JOE DIXON
St. Peters, MO

Joe, first of all, I'm glad you enjoyed the MAN Annual and that you found the many scale tips helpful. Judging from the kits you've mentioned, you should have no trouble building the Top Flite P-51 Mustang. Your observation regarding engine sizes is accurate. Outside of the new Webra .50, there isn't much available. As a general rule, especially with scale airplanes, you should use the largest recommended engine size. I seriously doubt you'd be as pleased with the performance of the Mustang if you powered it with a .40 rather than a .60. Considering price (and who doesn't these days!), the K&B .65 Sportster is an excellent buy and will work well in your Mustang. Fox engines also represent a good value. Good luck.

RAU

Reader Survey Radio Winner

Few times in my life have I been as pleasantly surprised as when the local UPS delivered my very unexpected prize from Air Age Publications. Of course, the reason is that I'm very unlucky at drawings.

A complete 5-Channel Futaba 5UAP PCM Radio System is far more sophisticated than any of the radios I now own. I see it's the very latest equipment Futaba has made available.

You could say I have more than a passive interest in *Model Airplane News*. I find the reading enjoyable and the information very helpful, so I look forward to every issue.

A little about myself: The airplane hobby began for me in high school, 35 years ago. My most ambitious project then was a B-size Buccaneer, kitted by Berkeley, I think. It was powered by a trusty .23 Ohlsson & Rice, and the plane made a good free-flight and flew real well. I still have a B-size Spacer model free-flight, with its silkspan covering all split and shrunk away. I must re-cover it sometime with this new shrink covering. You might say, I'm old-time modeling for sure.

After a four-year hitch in the USAF, my farming career began. There had been no hobbies after that until just two years ago. In 1986, I went to the Aviation Expo at Ida Grove, IA, and it was all very inspiring indeed.

Now at the age of 55, I'm back in the sport of modeling and flying, and I'm enjoying it as much as ever. So please understand that the Futaba radio will be put to good use and it's most certainly appreciated.

I thank you so much for the prize and also for your great magazine.

GEORGE RIEDESEL
Afton, IA

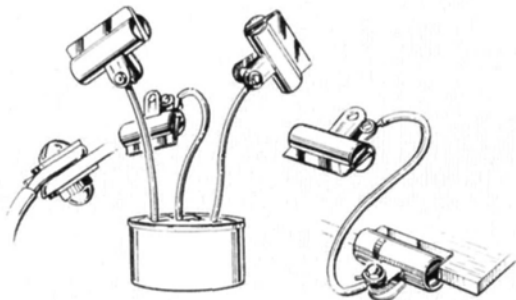
Welcome back George; the pleasure is ours and Futaba's. As I said, "not a bad deal for two bits!!"

RAU

We welcome your comments, opinions, and suggestions. Letters should be addressed to "Airwaves," *Model Airplane News*, 251 Danbury Road, Wilton, CT 06897. Letters may be edited for clarity and length.

Hints & Kinks

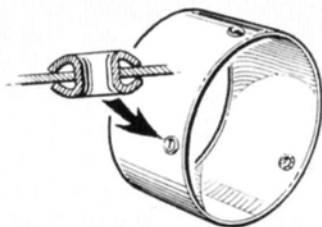
by JIM NEWMAN



EXTRA HANDS

Here are some beautifully "loose" sketches from a fellow illustrator. These "extra hands" are easily made of heavy-duty (say, No. 10) copper wire. Form an eye at one end, then bolt on a paper gripper using a pair of washers, a short machine screw and (a nice touch) an acorn nut. Two or three of these can be set in a tub of plaster after first forming a loop on the wire's end as an anchor. A variation is a gripper on both ends of the wire so that it can be clipped to the bench.

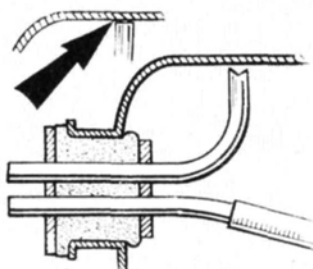
John French, West Haven, CT



CURE FOR CRACKS

Our contributor uses plastic cowls, but was frustrated by cracks around the mounting screws. To cure the problem, he purchased an eyelet kit and crimping punches from a hardware store, and now he firmly crimps eyelets into the mounting holes. This substantially reinforces the area. Dave says that a friendly shoe repairer can also set the metal eyelets for a nominal sum—but you should drill the holes where your plane needs them!

David Billy, Montreal, Quebec, Canada



CURE FOR STARVATION

Some engine-quitting problems can be traced to the brass-tank vent, which closes when it touches the top of the tank (arrowed) and causes fuel starvation. To prevent this, just file a vee-notch in the end of the brass tube, so that even if it does touch the top of the tank, the notches will still admit air and allow the tank to feed fuel.

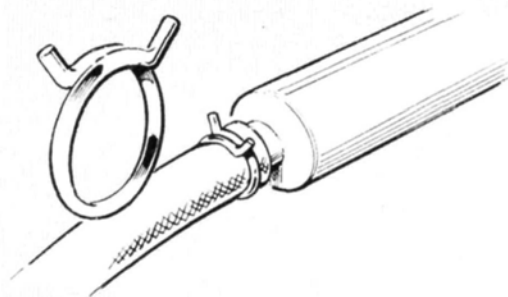
Sonny Palfini, Bayville, NJ



SHORT-CIRCUIT PREVENTION

Those ESV leads and sub-miniature phone jacks used for charging have a very small clearance between the solder tabs, and rough treatment, e.g. stepping on them, will cause those tabs to touch. Jim lost two Ni-Cd packs this way, so to prevent a recurrence, he filled the space between the tabs with electronic-grade silicone sealant. Do not use the vinegar-smelling tub sealant because it eats copper wire.

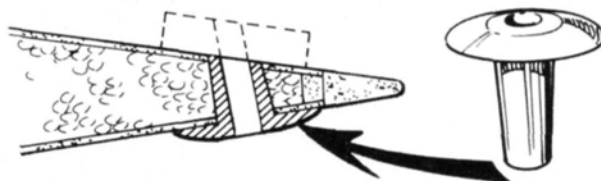
Jim Brown, Sarnia, Ontario, Canada



EXHAUST EXTENSION RETAINER

Bob lost two Craft Aire No. 511 Exhaust Diverters because the supplied nylon cable tie just failed to hold up in that oily, hot environment, and this would be true of most urethane rubber extensions. His cure was a 20-cent, 3/8-inch-diameter, automotive heater-hose clamp of the type shown, which has worked perfectly all season.

Robert Turner, Mesa, AZ



MOLDED WING-SCREW BUSHINGS

These 49-cents-a-pair No. 278-1643 Cable Feed-Through Bushings are readily available from Radio Shack and appear to be either nylon or ABS. They require a 3/8-inch-diameter hole and are ideal for use on foam wings and ARFs. The hole through the center is conveniently sized for 1/4-inch nylon screws. To be really effective, any blocks or bushings should be in firm contact with the wing-mounting block, and dotted, so that the nylon screws are in shear.

Bill Rogers, Jacksonville, FL

Model Airplane News will give a free one-year subscription (or one-year renewal if you already subscribe) for each idea used in "Hints & Kinks." Send rough sketch to Jim Newman, c/o Model Airplane News, 251 Danbury Rd., Wilton, CT 06897. BE SURE YOUR NAME AND ADDRESS ARE CLEARLY PRINTED ON EACH SKETCH, PHOTO, AND NOTE YOU SUBMIT. Because of the number of ideas we receive, we cannot acknowledge each one, nor can we return unused material.

CLASSIC SPORT BIPLANE

by GERALD R. GARING

NOTHING SEEMS TO be as universally admired as a biplane. Almost every newcomer to the hobby dreams of flying one. But before long, he's convinced that a biplane is reserved for only the most proficient builders and pilots. After building a number of different biplanes, I've concluded that this just isn't true. Properly aligned and balanced, a biplane can be as predictable and stable as any sport plane.

This plane was designed to be quickly and easily built at a size that would allow good performance on a Q-35 Quadra. It also had to be easily transportable and require minimal set-up time at the field. In



THIS GREAT LAKES
LOOK-ALIKE COULD JUST BE
YOUR INTRODUCTION TO
"GIANT" SCALE

PHOTOS BY GERALD GARING





SPECIFICATIONS

Wingspan: 72½ inches

Length: 56 inches

Wing Area: 1640 square inches

Power req'd: Quadra 35 or equivalent

Radio channels req'd: 4

Construction materials: Light ply, aircraft ply and balsa

addition, I wanted to capture the look of a Great Lakes Special. With minor cosmetic adjustments and the appropriate color scheme, this plane could just as easily be a Super Stearman or a Waco. The addition of an effective smoke system will really enhance the aerobatic classic biplane image.

The prototype was completed in the spring of 1987 and test-flown in late May. The plane flew so well that I ran 5 gallons of gasoline through it by September. The plane's handling is such that I've given several low-time pilots (who had only recently soloed) the plane in the air. All were able to handle it, and none could believe how easily it flew. It will maneuver when asked; it has been looped, rolled (aileron and point), snapped, spun and inverted, with many combinations of these. Takeoffs and landings are as straight as an arrow.

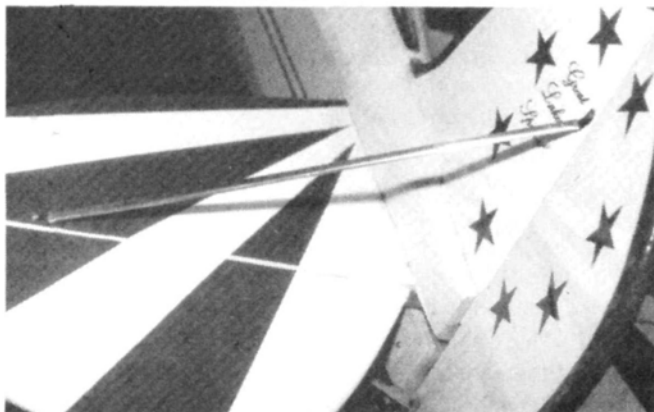
Let's get to the construction. Basic construction is much the same as that found in .40- or .60-size bipes. The cabanes are

easily made from 5/32 music wire, while the cowl and wheel pants can be balsa or fiberglass. (That should take care of any excuses you might have to not build it!) There's more than enough room for the radio and smoke-system equipment. The wings and tail feathers are of typical construction, while the fuselage is a basic box with formers added to give the rounded appearance. I won't give a step-by-step sequence, but will use this article to discuss the critical and specialty items. I used Pacer's* Zap glues (Zap, CA+ and Slo-Zap) for almost all of the construction. Epoxy was used for high-stress areas (e.g., wing mounts, fire wall, etc.).

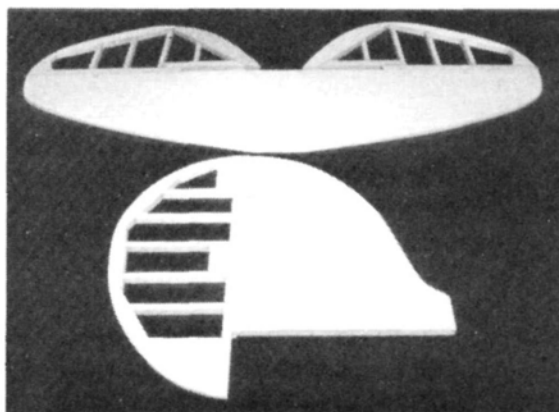
FUSELAGE: Begin by building the two sides from lite-ply



CLASSIC SPORT BIPLANE



Streamlined aluminum tubing bracing is functional, ties tail group together. Big bird tails can shake a lot, especially when "gas" powered.



Completed tail group after sanding. Ready to cover.



and $\frac{1}{4}$ -inch-square spruce. Join the two sides, keeping everything square. Add the side and top formers. Sheet the areas shown on the plan and add side and top stringers. The top hatch can be cut to allow access to the cabanes, fuel and smoke tanks. The lower hatch is made of $\frac{3}{8}$ -inch balsa, carved to fit. Be certain that the slot for the horizontal stabilizer provides for 1-degree positive incidence.

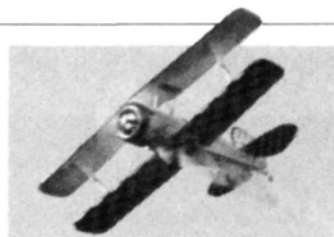
CABANES AND LANDING GEAR: The cabanes are bent from $\frac{5}{32}$ music wire. (A K&S* Mighty Wire Bender makes bending this wire very easy.) Bend the front and rear cabanes and the inter-cabane wires as shown on the plan. Goldberg* $\frac{5}{32}$ nylon landing-gear straps are used to fasten the cabanes to the maple mounts. (Make sure the cabanes are perpendicular to the mounts.) Secure the inter-cabane wires with soft wire, and solder the assembly together using silver bearing solder, such as Stay-Bright. The landing-gear wires are of $\frac{3}{16}$ -inch music

wire and soldered together in place, using the fuselage as a jig.

WINGS: The wing construction is made easier by the fact that all upper and lower ribs are the same, except for the rear spar locations. Four of the lower ribs are made of lite-ply and are used in the bays that house the aileron servos. The construction is very straightforward and shouldn't present any real challenges. Before sheeting the center section of the top wing, set the wing in place on the completed cabanes and glue the plywood wing-mount plates into the wing. Although the planes have 1 degree of negative incidence in the upper wing, they were set at zero and shimmed with washers to allow fine adjustments later. The ribs containing the aluminum strut plates should be assembled before they're installed in the wings. Be sure the wing halves are securely joined, and wrap the lower wing center section with 2-ounce glass-cloth and resin. The wings can be

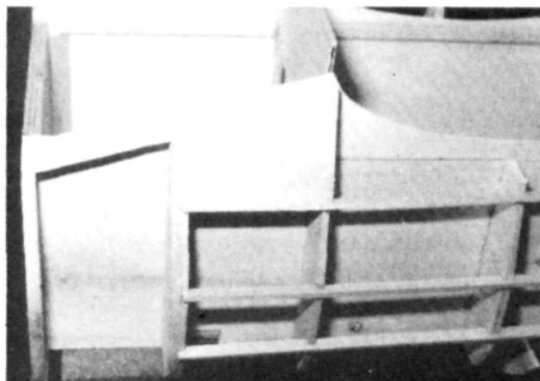
set aside for final assembly.

FIN AND STAB: Like the wings, the tail feathers are also very straightforward and need little in the way of instructions. Decide whether you plan to use separate halves or a one-piece elevator. Glue the

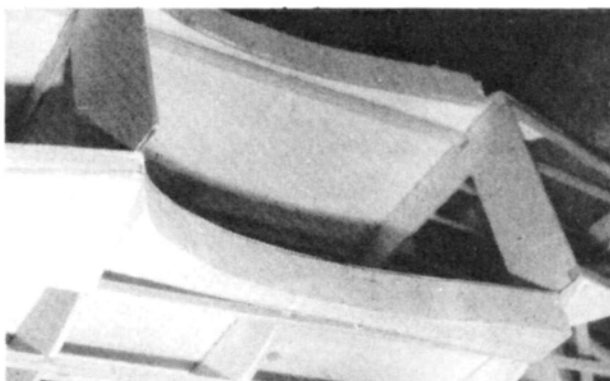


#5891 Classic Bipe \$17.50

Looking to try a large, gas-powered, easy-to-build biplane? This one easily becomes your favorite classic with just some minor cosmetic changes. With a large 72-inch span and 1,640 square inches of area, the lightly loaded, Great Lakes look-alike is an ideal aerobatic airplane and is especially impressive when smoke-equipped. Uses conventional building techniques and materials. Intermediate-level skills required. Three, well-detailed plan sheets.



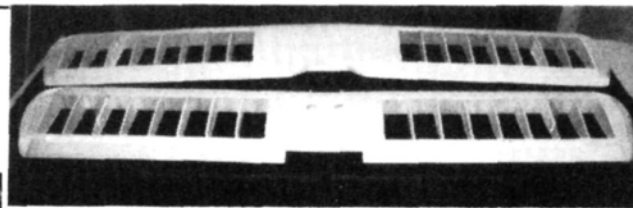
Forward fuselage structure uses conventional techniques and materials. Side formers provide transition to round cowl.



Lower wing saddle area showing blocks prior to carving and shaping.



Lower hatch area provides plenty of room for fuel tank, battery and smoke equipment.



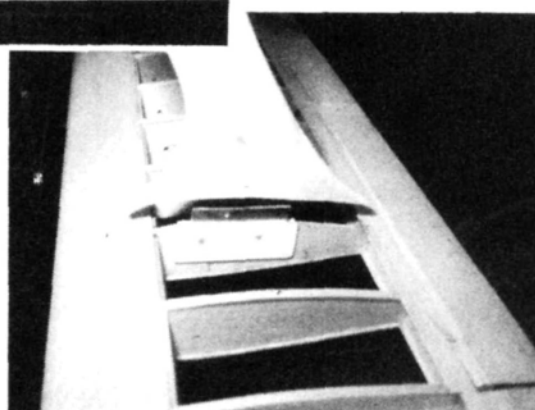
Left: Completed wings. Although large, they're easy to build and go together quickly.



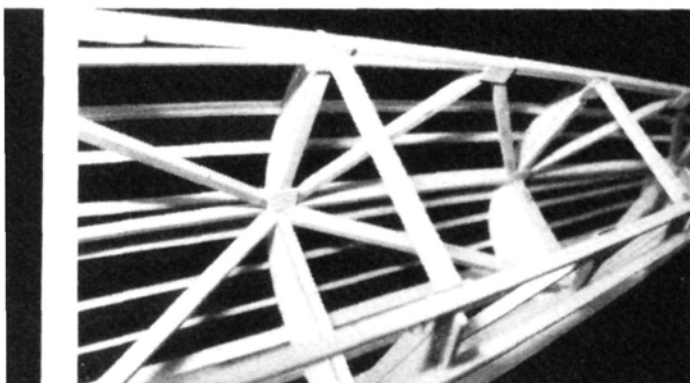
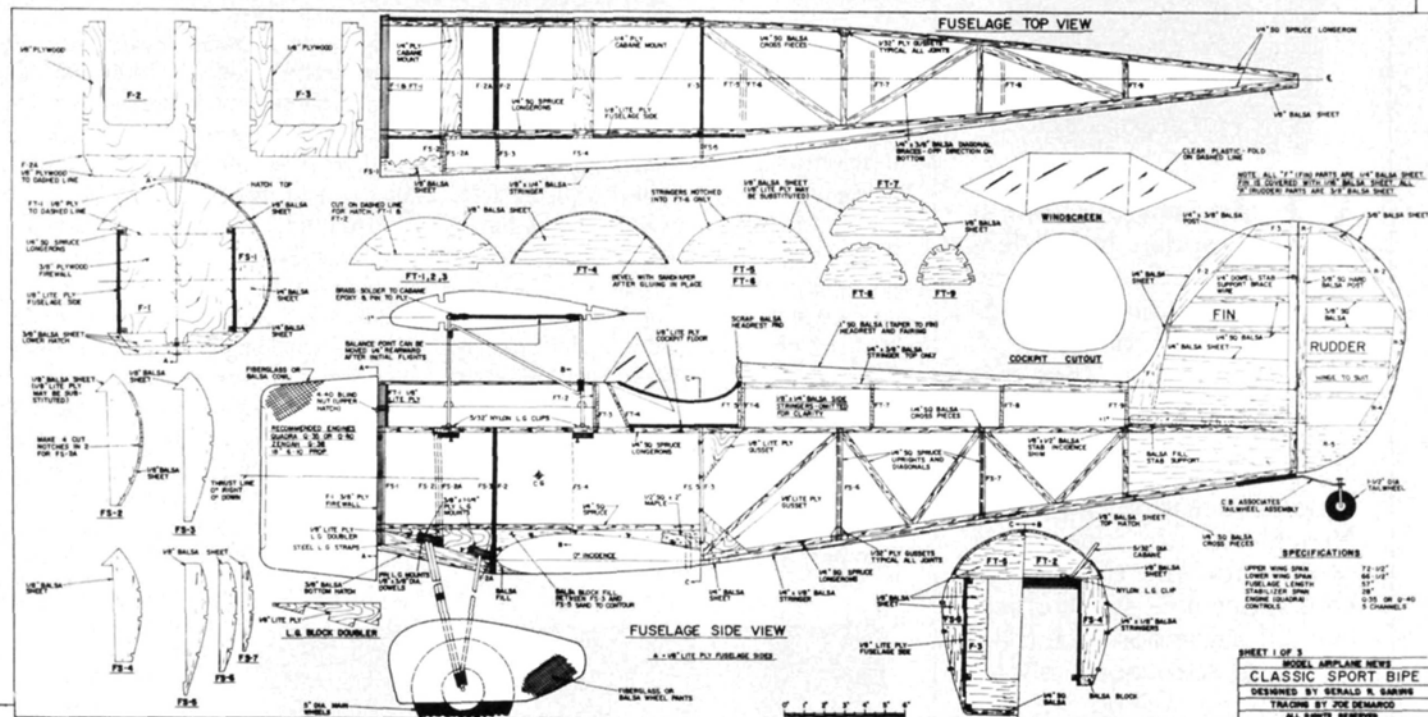
cabane plates are mounted on music-wire struts. Upper wing is attached to these.



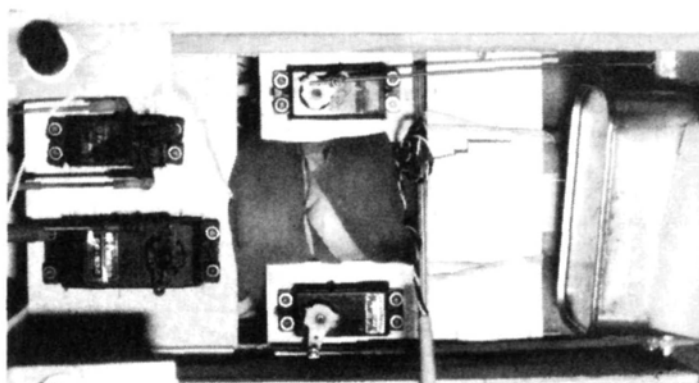
Music-wire cabane installation is simple and rugged. This is usually the most difficult part of biplane projects.



Interplane strut attachment method is rugged and necessary.



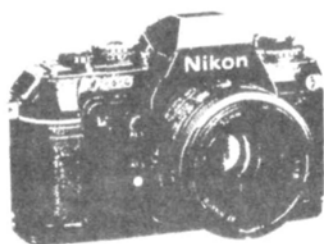
Plywood gussets are used at diagonal joints.



Standard-size servos look like "minis" in huge radio compartment. Large servo used on elevator.

Wanted:

**AUTHORS
CONTRIBUTORS
PHOTOGRAPHERS**

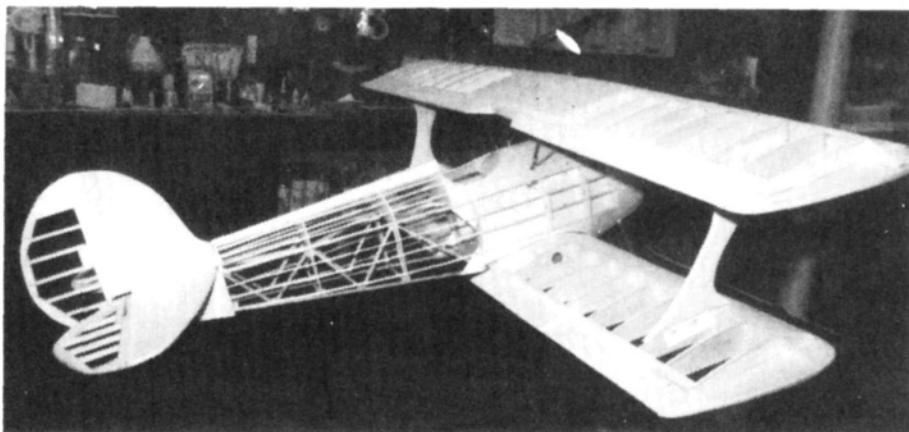


We think a lot of our readers have ideas that are worth sharing. How many times have you read an article and said, "I could do that!" or "That's not the only way to do that; mine's easier!" Could very well be! Here's your chance! We'll be expanding **Model Airplane News** and are looking for additional contributors to help us accomplish this objective. Of key importance is the ability to take good photographs; the writing we can help you with. Interested? It's much easier than you might think.

Let's hear from you. Send in your ideas, articles, thoughts and photos; we're looking forward to it.

**RICH URAVITCH
MODEL AIRPLANE NEWS
AIR AGE PUBLISHING
251 DANBURY ROAD
WILTON, CT 06897**

CLASSIC SPORT BIPLANE



Bare bones and beautiful! "Great Lakes" shape of fin and rudder is classic.

horizontal stab to the fuselage, ensuring that it has 1 degree of positive incidence. Glue the fin into place.

FINAL ASSEMBLY: Bolt both wings to the fuselage. Sand the wing saddle, if necessary, so that the lower wing has zero incidence. Shim the upper wing for 1 degree negative incidence. Custom-build the interplane struts. Leave a 1/16-inch space between the wing surface and the strut so that small incidence changes can be made later. Install the fuel tank, the smoke tank and all related plumbing. Bolt on the engine, muffler and kill switch. Double-check all thrust lines and incidences.

I like to install the radio at this time. Knowing that I can reinstall it, I then

rod system. Standard servos are used for throttle and smoke. A 1200mAh battery pack provides the power to run all the servos. The control throws should be set as follows for initial flights: ailerons, 3/4 inch up and down; elevator, 1 inch up and down; rudder, 2 inches right and left.

The smoke system is well worth every minute it takes to install. The larger gas engines will produce adequate smoke, so the only challenge is to get the smoke fluid into the muffler when you want it. I used crankcase pressure to the smoke tank to move the fluid. A one-way check-valve is needed to have positive pressure. I made my valve using a Master Aircrew* two-piece fuel filter. Remove the screen and place a small BB and a cut-down pen-

spring inside. (The spring should have only enough tension to hold the BB in place.) You should be able to blow through the valve easily one way, and not at all the other. A Du-Bro* smoke valve is used to turn the smoke on and off. The fluid goes through a "T" fitting so that it enters the muffler in two places. A lot has been said



Molds and glass parts for wheel pants and cowling.

remove it to cover the plane. As I already mentioned, two standard servos are used for the ailerons. One heavy-duty servo is used on the elevator. A fiberglass arrow-shaft runs down the center of the fuse to a control horn. A small hatch allows access to the elevator linkage. A standard servo is used on the rudder with a pull-pull ny-

about various smoke fluids, but I've had very satisfactory results with plain kerosene. Save the expensive stuff for special occasions.

Glue the maple blocks for the cowl attachment and tap them for the nylon screws. Install the tail-wheel assembly. Attach the wheel pants to brass plates sil-

ver-soldered to the landing gear. The outside of the wheel pants are screwed to a brass plate silver-soldered to a $\frac{3}{16}$ -inch wheel collar. Center the wheels using wheel collars, making sure there's no way they can rub inside the pants.

COVERING: The plane can now be stripped down for covering. If desired, it can be covered and trimmed entirely in MonoKote*, which was the method I used on my second airplane. The first had Super Coverite* on the fuselage, and MonoKote on everything else. It's just a matter of personal preference. The structure doesn't depend on the covering for its strength. It's nice to know that the brain work is all done, and that all that remains is to reinstall the equipment. Check the CG and make sure the plane balances at



Dummy pilot adds a nice touch of realism to the covered and decorated airframe.

the location shown on the plan. Neither plane required the addition of lead; both balanced as indicated, but don't hesitate to add lead if necessary. The completed plane should weigh about 17 pounds and the wing area allows it to handle the lead if it's needed.

PERFORMANCE: This model is very stable and forgiving. It handles much like a typical sport model, yet retains the realistic flight characteristics of giant-scale airplanes. During initial flights, take the usual precautions, until you're familiar with it. Don't horse the model off, but let air speed build and the wings develop the necessary lift. Coordinated rudder and ailerons aren't needed, but they're fun to use when slipping for cross-wind land-

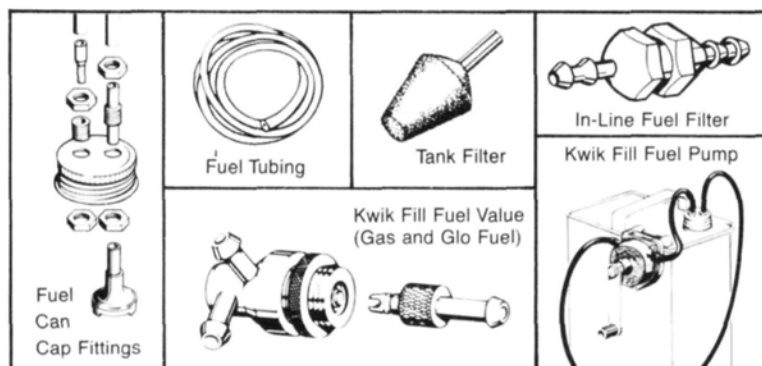
(Continued on page 64)

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How To:

by RANDY RANDOLPH

MAKE A GLUE BOTTLE

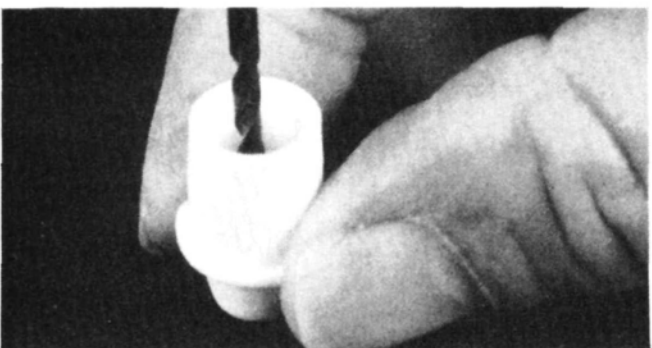
There are times when the application of a small amount of glue in just the right place is called for, and sometimes, that place is difficult to reach with conventional glue containers. The photos show how to make a very inexpensive and useful bottle for white or model airplane-type glues.



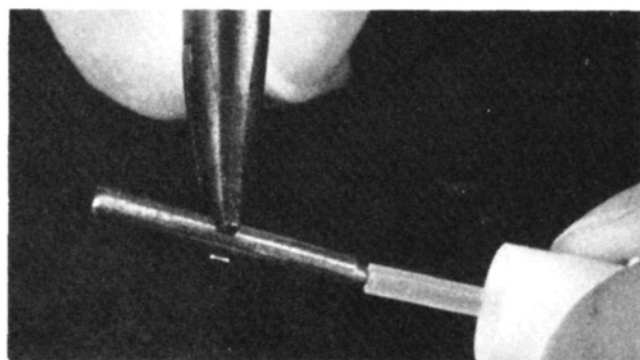
1. The materials needed are an empty nasal-spray bottle, a $\frac{3}{32}$ -inch drill and a piece of $\frac{1}{8}$ -inch wire.



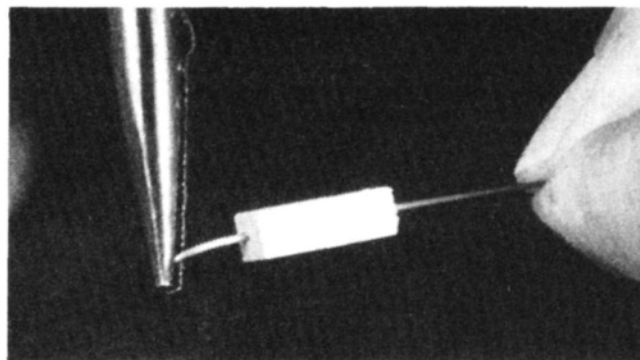
2. Remove the top from the bottle by pressing it to one side and slipping a knife blade into the exposed crack and prying it off. The writing on the sides of the bottle can be removed with a paper towel and acetone or lacquer thinner.



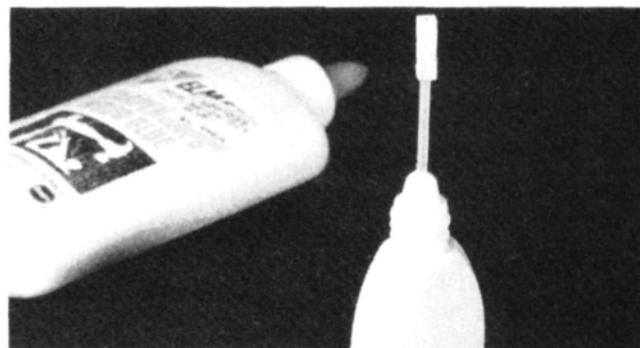
3. Drill a hole completely through the top. Usually, the Teflon dip tube is about $\frac{3}{32}$ inch in diameter, so a $\frac{3}{32}$ -inch hole is just about right.



4. Slip the Teflon tube all the way through the top, and flare the bottom with a piece of pointed $\frac{1}{8}$ -inch music wire that has been heated. Pull the tube up through the top until the flare is seated in the bottom of the hole.



5. Make a stopper from $\frac{1}{32}$ -inch wire and a piece of $\frac{1}{8}$ -inch-square balsa; bend the wire into a U shape at the top, and glue it into the wood. The wire should be long enough to go completely through the tube and extend about $\frac{1}{32}$ inch into the bottle.



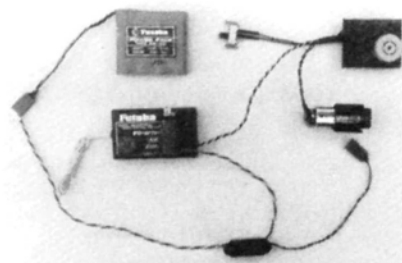
6. The completed glue bottle. Model airplane cement, like Ambroid, can be thinned slightly with lacquer thinner. White glues like Elmer's or Titebond can be thinned with water. The glue won't stick to the Teflon tube.

MINI-VAL FAIL-SAFE SYSTEM

by MIKE MAYES

Battery back-up provides some insurance and peace of mind

AT ANY MODEL SHOW, there's usually one airplane, boat, car, or another product that catches your eye. At last year's WRAM show at Yonkers Raceway, I came across a demonstration of a wonderful product that might be the answer to many R/C pilots' nightmares of the dead-battery syndrome and the sometimes impossible task of trying to find that



The Failsafe Flight System is a compact unit, as indicated by the 9V dry battery power source. It requires a connector to match your system.

lost plane. The product is T&D Flight System's Failsafe Flight System.

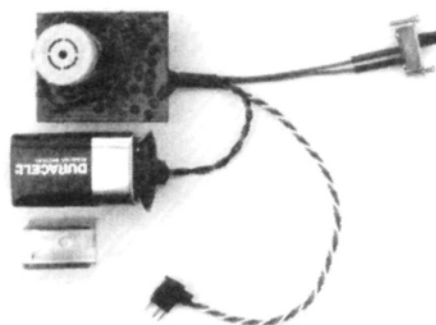
The Failsafe Flight System (F.F.S.) has a printed-circuit board about 1.5 square inches and weighs less than 1 ounce. It's a very clean, simple layout, and the buzzer is attached directly to the bottom of the board. The F.F.S. connects to any unused channel in your receiver (see Figure 1). If you don't have a spare channel, you can

connect the F.F.S. in parallel with one of the servos (see Figure 2). The F.F.S. comes with no connectors, so you must supply the connector that matches your receiver.

FEATURES: The Failsafe Flight System offers these following features:

- Powered by a 9V battery
- Low-battery indicator for receiver batteries
- Automatic battery back-up for receiver flight system
- Monitors activity on your frequency when your transmitter is off
- Aids in locating lost airplanes
- Small
- Low current draw

OPTIONS: The F.F.S. comes with wires to connect a second buzzer if you want one. This buzzer is available at Radio Shack.



The FFS module is shown here with a Futaba receiver and battery pack to provide a size comparison. Cheap insurance!!

POWER: The F.F.S. is powered by a 9V alkaline transistor battery. This is a logical approach, since the idea is for the F.F.S. to supply the receiver with *back-up* power, not *primary* power. The 9V battery has enough capacity to supply power to the



receiver long enough to allow you to land the plane safely when the warning sound is activated. The 9V battery is light, small, and can be easily replaced. The manufacturer doesn't supply the battery hold-down bracket that's needed to hold the battery in position during flight. You can build a bracket, or buy one at your local Radio Shack (Part No. 270-326A). I recommend very strongly that you secure the battery before attempting to use the F.F.S. in flight.

LOW BATTERY INDICATOR: When the batteries in the receiver pack drop below a preset level of 4.8 volts, the F.F.S. emits a beeping signal to remind you that your batteries are getting low and that it's time to recharge your receiver batteries and check the condition of your transmitter batteries.

AUTOMATIC BATTERY BACK-UP: When the low-battery indicator is activated, the F.F.S. automatic battery back-up is activated and the 9V alkaline battery supplies power to the receiver.

FREQUENCY MONITOR: With the transmitter off and the receiver on, the F.F.S. works like a frequency monitor. A loud, steady beeping is emitted from the F.F.S. if the receiver isn't detecting interference. However, if the beeping signal is

(Continued on page 28)

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SUSSEX, WI. 53089	4 sh.—\$20.00 ppd.
	5 sh.—\$22.00 ppd.

MINI-VAL SYSTEM

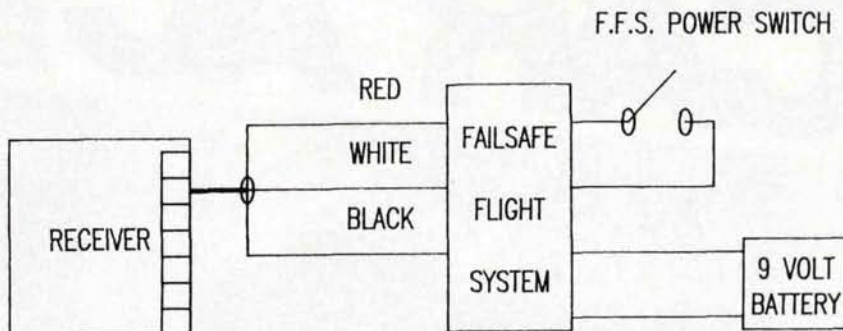


Figure 1
F.F.S. CONNECTED TO ANY UNUSED CHANNEL OF THE RECEIVER

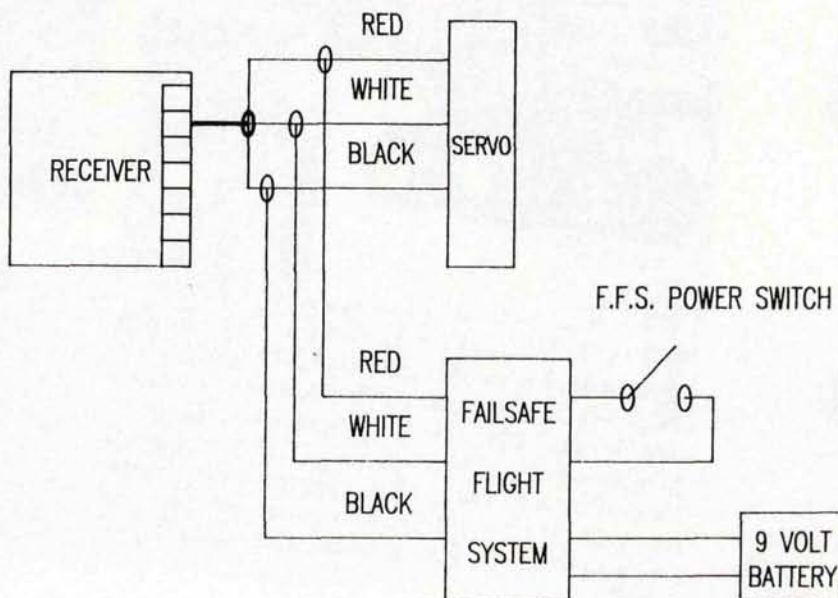


Figure 2
F.F.S. CONNECTED IN PARALLEL WITH ANY ACTIVE SERVO

intermittent or erratic, then you know the receiver is getting signals from some other source.

EMERGENCY LOCATING DEVICE: With the transmitter off and the receiver on, the F.F.S. emits a loud, steady beep that's very useful in finding lost planes. If you forget to turn on the transmitter before takeoff, you're reminded by the loud, steady, beeping signal.

Every now and then, a product comes along that can make a significant contri-

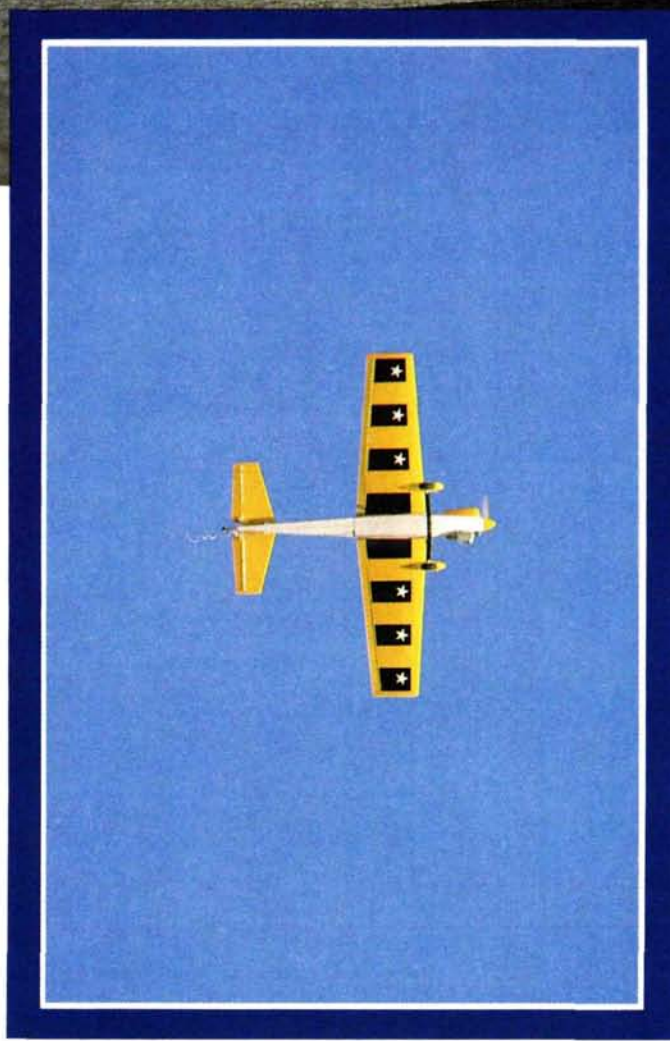
bution to the sport of R/C flying. T&D Flight System's Failsafe Flight System is just such a product. It offers the safety of a battery backed-up receiver system and the convenience of an emergency locating device in the event of one of those unforeseen crashes.

**Here's the address of the manufacturer featured in this article:
T&D Flight System, P.O. Box 1782, Staten Island, New York 10314. Attn: Alex Kronfeld. Phone: (718) 984-9121.*



Return with us now to those thrilling days of yesteryear! These little ARFs could very well bring back the fun of sport racing!

PHOTOS BY RICH URAVITCH AND NICK ZIROU



HOW DO YOU determine the better of two vehicles, whether they're cars, boats or planes? Race them, of course! Competition between machines almost always involves racing. Who's the fastest down a $\frac{1}{4}$ mile, cross-country, up a mountain, or around an oval is what determines the best operator and vehicle. Automobiles have numerous classes competing on all types of racecourses, and boats also run the gamut from jet skis to the giant aircraft or turbine-engine-powered unlimited hydroplanes. Aircraft also have a great variety of classes from Formula One through unlimiteds, including biplanes, AT-6 and efficiency events. Fliers of R/C model airplanes have basically four pylon-racing events to choose from: $\frac{1}{2}$ A, $\frac{1}{4}$ Midget, Quicky 500 and Formula One.

The introduction of Hobby Shack's* new EZ Sports Formula Series of .25-size racers has paved the way for a new class of model racing. In this Series, there are two models to choose from: the mid-wing Formula M or the low-wing Formula L. Both have a $44\frac{3}{4}$ -inch wingspan and 357 square inches of wing area, which is a very convenient size: small enough for easy transportation and storage, but large enough to fly really well.

This is my second EZ model. The first was the



SPORT AVIATION EZ 250

RENO RACER

by NICK ZIROLI

SPECIFICATIONS

Type: ARF Sport Racer/Sport Flier
Span: 44³/₄ inches (low-wing); 44¹/₂ (mid-wing)
Length: 36¹/₂ inches
Weight: 3 pounds, 7 ounces
Wing Area: 358 square inches
Wing Loading: 22 to 23 ounces per square foot
Power Required: 25 2-stroke
Number of Channels Required: 4

Suggested Retail Price: \$200.

Features: Pre-decorated, pre-colored foam sheet bonded to wooden structure. Complete hardware package including fuel tank, wheel and spinner.

Comments: Easy to assemble, nice-flying sport model, a little "hot" on landing, but generally mild-mannered.

PT-19, which I reviewed in the February '89 issue, and if you read that review, you know how impressed I was with the EZ assembly concept and the plane's outstanding flying ability. The PT-19 has almost 50 flights on it, and it looks as good now as on the first day I test-flew it. Everyone agrees that it flies great.

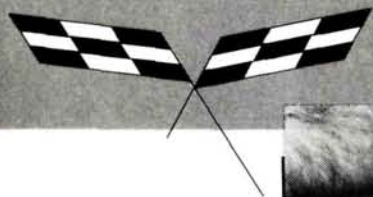
THE KIT: The Formula M is everything—and more—that the PT-19 is. The packaging is excellent, with all parts in plastic bags. The hardware is packaged in separate bags according to function: motor-mount hardware in one, landing-gear, wing-mount and tail-wheel hardware in others. The kit's completeness is outstanding. A 4-channel radio system, a .25-size engine, a prop and a fuel line are the only things you have to supply. The receiver and servos must be small (most new systems will fit into the fuselage and wing), and I use Futaba* S-130 servos, which just fit. The World Engines* Expert S-25 servos that I planned to use are a little too tall for the mid-wing Formula M, but they'd fit the low-wing Formula L.

ASSEMBLY: Assembly requires only a minimum of tools: I used no more than a pair of needle-nose pliers, a small and medium Phillips screwdriver, an X-Acto knife with a No. 1 blade, 1/16-inch, 7/64-inch and 1/8-inch drills with a small battery-

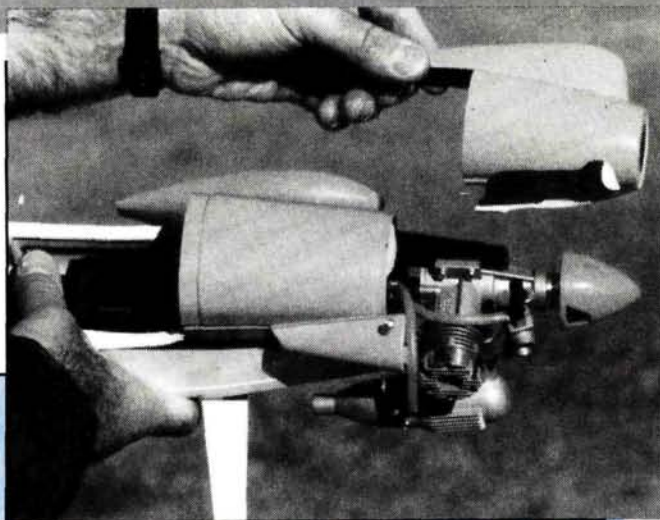
powered hand-drill, some assorted sandpaper and a yardstick. Epoxy and Zap* hold everything together.

The 14-page instruction book includes dozens of photos showing just about every construction detail. In spite of this, some areas might be unclear to less experienced builders, and a more detailed text would help. And *nowhere* do the instructions mention installing a receiver or a battery.

Assembly starts with the wing. Both panels are 100-percent complete and only require joining. This is done by epoxying a couple of plywood ribs to each panel and assembling them with an 1/8-inch plywood joiner. Vacuum-formed wing center covers are attached with Zap over the top and bottom joint.



Cowling was made removable for total engine access, but it can be permanently glued in place.



The quality of die-cutting of the 1/8-inch plywood deserves praise. There are some intricate parts, yet they push out cleanly and fit perfectly. The completed wing is very light, strong and—most important—accurate.

Wing-mount plate and blind-nuts are epoxied into the fuselage. Trial-fit the wing to the fuselage. (I had to open up the front wing mount slot so that the wing tab would fit.) The method of locating the mounting-screw holes in the wing is exactly as I described for the PT-19. Instead of hit-or-miss measurements, the screw heads are used to leave marks on the bottom of the wing, and holes are drilled at these points.

The instructions don't point out that the wing should be square to the fuselage, but, of course, it should be. The measurements from the wing tips to the center of the tail should be equal. The wing holes will probably need some adjusting with an X-Acto knife or a file to make the bolts fit correctly. Because of this, I didn't glue the bolt plate to the top of the wing until eve-

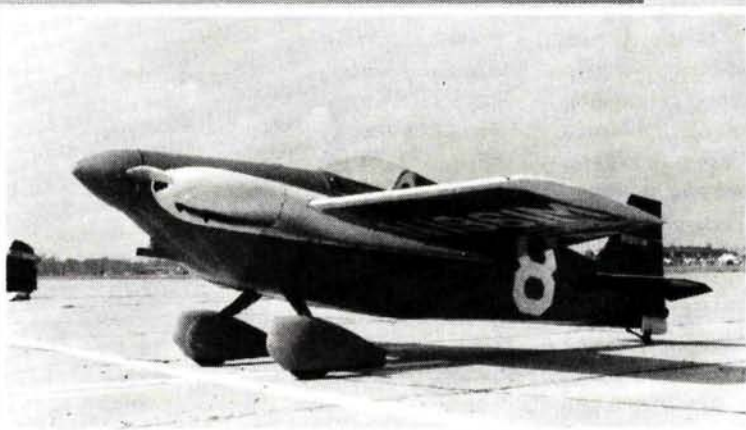
FASTER THAN A SPEEDING BULLET

by BUDD DAVISSON

AIR RACING HAS always had a caste system in which the Unlimiteds were at the top and everything else that raced was somewhere else. It was almost as if the rest of the racing machines were there to fill in the time between the Unlimiteds. In some people's minds, that's the way it still is at Reno.

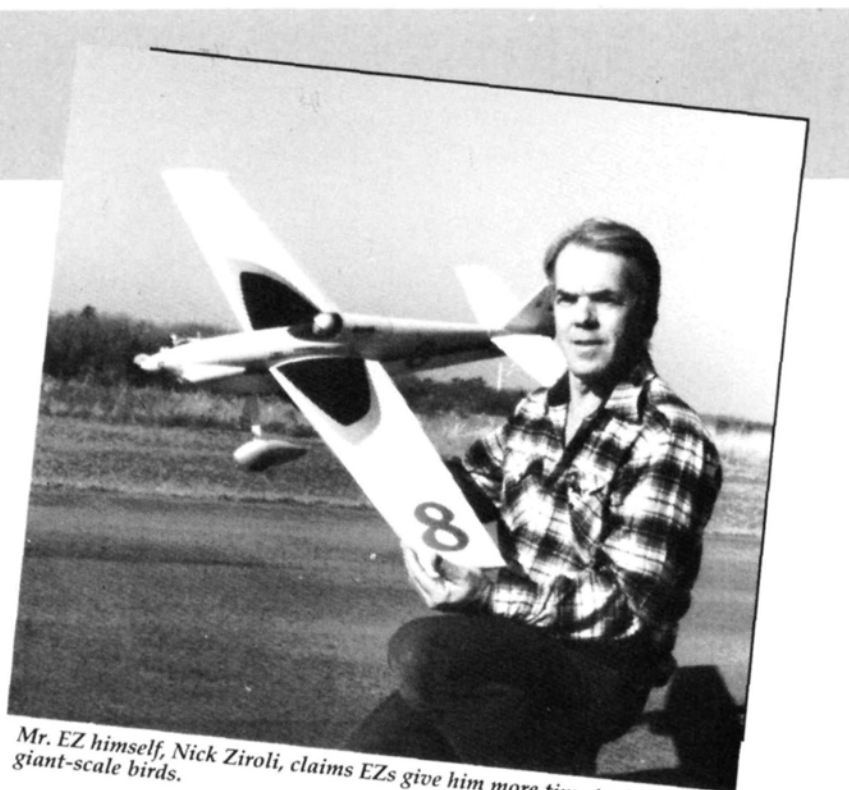
There was a time, however, when the only racing game in town was the screaming little bullets with names like Goodyear racer or Formula 1. They were built with certain restrictions, the two most severe being a minimum of 66 square feet of wing area and an engine with no more than 190 cubic inches (that really meant a C-85 Continental). There were other requirements including sight angles, but speed is a function of drag and power, so the first two are the most important restrictions.

The F-1 racing was the only kind to survive the disastrous effects of Bill Odom losing his P-51 Be-guine (owned by Jacqueline Cochran) in a turn and crashing inverted into a residential area. For the entire 1950s, and, until the resumption of Unlimiteds at Reno in the early '60s, the Goodyears were all



there was to air racing, and they raced at dozens of smaller events around the country. Today, the basic airplanes are still the same but they have 0-200 Continentals and unbelievably clean aerodynamics.

The airplane pictured is the Pitts Lil Monster, which was among the front-runners during the '50s and into the '70s. An all-but-forgotten design of Curtis Pitts (of Pitts Special fame), its lines represent a classic Formula 1 racer. ■



Mr. EZ himself, Nick Zioli, claims EZs give him more time to design his giant-scale birds.

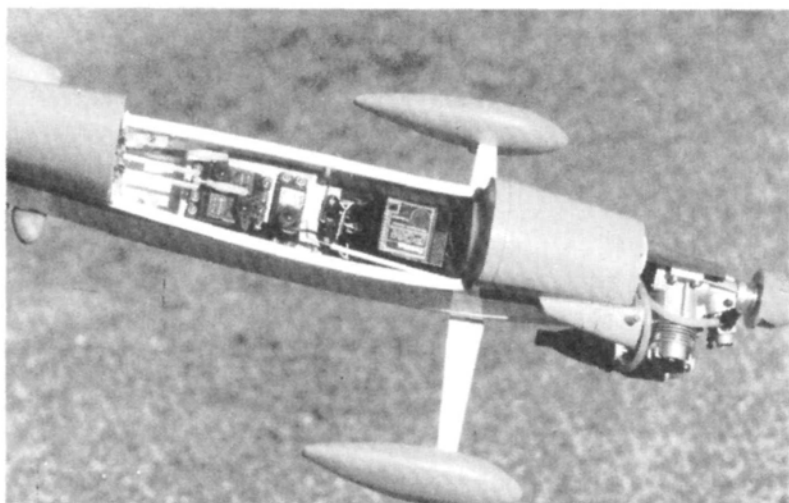
rything was in place and the holes could be transferred to the plate via the bolt heads. When the plate has been drilled and glued into place, the screws fit perfectly through the wing into the blind-nuts.

The landing gear is of spring steel and very strong. There are wheel pants that are easy to mount on the axle and won't rotate like many do. The only change I made to the Formula M was to reinforce the landing-gear mount. A plate of 1/8-inch aircraft plywood was epoxied inside the fuselage bottom, and the landing gear was then mounted with 4-40 screws and blind-nuts through it. This was done for two reasons: The plywood used in these models isn't the strong 5-ply "aircraft" type

and, in most areas, needn't be. The wood used is quite adequate. I simply didn't like bolting the rather narrow landing gear to it with just two washers and nuts inside. The new plate is stronger and spreads out the load. The other advantage is that with blind-nuts inside, the landing gear can be removed if necessary without removing the fuel tank, which you're instructed to hold in place with silicone sealant. I found this unnecessary, since the wing holds the tank in place.

A strong plastic engine mount is supplied, and this must be drilled to fit the

(Continued on page 36)



Radio installation on mid-wing version is more servo-size sensitive than low-wing racer, but most modern servos will fit.

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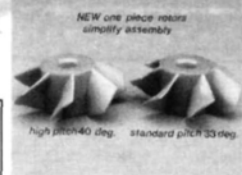
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The kit is very complete. Typical of the EZ line, just add engine, prop, radio and a few hours of time.

engine used. This is best done in a drill press, if possible. If a press isn't available, a hand-drill or a power-drill used carefully to keep the holes square to the mount will do. The engine and fuel tank are installed into the fuselage.

Install the servo mounts, the servos and the pushrods. Unlike the PT-19, holes are provided at the tail for pushrod exits, and this makes installation a lot easier. All the required parts and hardware are included. Plastic cowl parts are very accurately formed and trimmed, and they can be glued into place, or secured with screws so that the cowl can be removed if necessary. I chose the latter method. Three sheet-metal screws in wooden blocks epoxied to the fire wall hold the cowl in place.

The stabilizer is complete (including hinging) and requires only that the horns be mounted and epoxied into place. The fin and rudder must have the hinges epoxied into place along with the tail-wheel assembly. This requires slotting the tail post and drilling the rudder for the tail-

wheel strut-wire. (The instructions oversimplify this step.)

Cockpit fairing and canopy complete the assembly of the Formula M. Stick-on markings are supplied to dress up the finished model, and I also installed a pilot under the canopy. I don't understand why, among all the vacuum-formed parts supplied, there isn't a two-piece (front and back) pilot in these kits. It would add just the right finishing touch and make the kit really complete.

PERFORMANCE: Flying the Formula M went without a hitch. If it looks right, it generally flies right, and the Formula M really looks right. The only change I made was to reduce the aileron throw a little. My friend Frank White brought out his new Formula M on the same day as I tested mine, so we had two to compare. Both flew well—mine with the Magnum 25 and his with an Enya* 25. We tried 7 1/2x7 and 8x6 props. On 10-percent nitro fuel, it was difficult to tell which was really better. On higher-nitro fuel, I think the prop will have a big effect on perform-

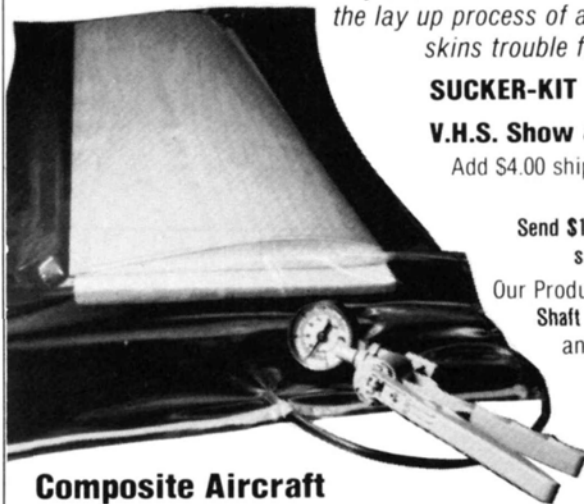


Could be at the starting line of the full-scale Reno event. Size and ease of assembly make this class of racing easy to get into.

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ance. We both had trouble making consistently good landings: if the plane didn't touch down in a nearly perfect three-point attitude, it would bounce and porpoise quite badly.

It was perfectly calm on the day we flew, so it was difficult to slow down these clean airplanes for landing. This didn't help matters, but I think that if the landing gear were about 1/2 inch further back, it would reduce this problem without producing a tendency to nose-over.

Flying two similar airplanes of the same color is a problem. It's difficult to stay with yours when the planes are close, especially when they cross each other's paths. The addition of a different color and pattern of trim, or even a totally new color scheme, would be a big help. I'm sure that burnishing the plane with fine steel wool would produce a surface to which epoxy or urethane paint would adhere. The manufacturer (Sport Aviation Co. Ltd.) might even want to consider producing unfinished versions of the Formula M and L250. A white matte finish would give an easy-to-paint surface that should have good adhesion. (Editor's Note: We're presently preparing a "How-To" article describing methods for finishing the glossy-finish EZs. The article will show builders both how to "personalize" and how to "keep track of" their racers in the heat of competition. Watch for it.)

To sum up: The Formula M is easy to build and fly, and the EZ Hobby Shack kits are the finest available. There's nothing of any significance to fault with the kit's parts or assembly. The few comments I've made about vague instructions are very minor problems. The difficulty with doing a review of something as well-done as the Formula M is trying to find something negative to point out, and one tends to nit-pick things that, in most cases, would be overlooked. The average modeler won't have any difficulty constructing and flying the Formula M or Formula L. The introduction of these planes could readily bring some fun to sport pylon racing.

*Here are the addresses of the companies mentioned in this article:

Hobby Shack, 18480 Bandilier Circle, Fountain Valley, CA 92728.

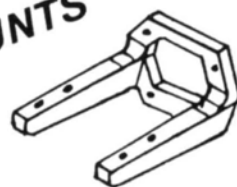
Futaba Industries, 555 W. Victoria St., Compton, CA 90220.

World Engines, 8960 Rossash Ave., Cincinnati, OH 45236.

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This "how-to" effectively solves what used to be a problem for the small-stepped

THE COX 1/2A ENGINES

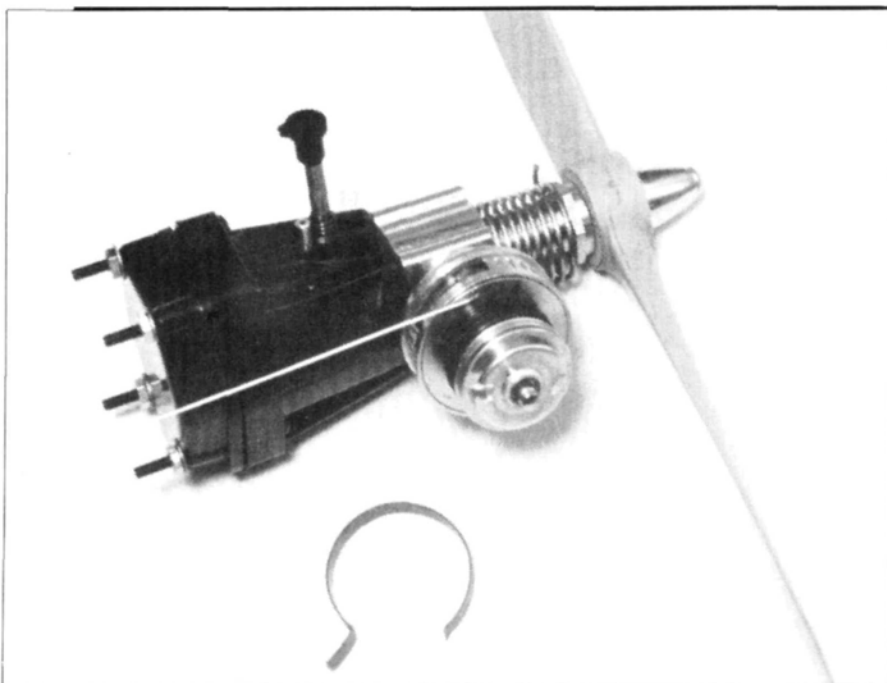
by JOE WAGNER

THROTTLING

Although intake throttles for the various Cox reed-valve engines have been available for several years, in practice, they've seldom performed well. The most effective speed-control device for Cox 1/2A motors is the exhaust throttle: a rotatable sleeve around the cylinder that slows the engine by restricting its exhaust outflow.

Throttles of this type made from steel tubing are manufactured by both Cox Hobbies* and Ace R/C*. They're essentially identical, work exactly the same, and suffer from the same two design weaknesses. The primary deficiency is an inefficient, hard-to-hook-up actuating method. A spring-steel "snap ring" fitting in a groove around the base of the throttle barrel provides the actuating arm for the throttle pushrod. The reason for this unusual, awkwardly placed actuating arrangement is simple enough. The angular location of Cox engine exhaust ports is random. No two motors are likely to have their exhaust ports aimed in precisely the same radial direction. Thus, it proved impossible to design an exhaust throttle sleeve with a fixed actuating arm for the throttle pushrod. And since an adjustable attachment point had to be provided, the snap ring seemed the best solution. It grips its groove so firmly that vibration won't move it; yet it can be radially repositioned as necessary.

The second problem with steel exhaust-throttle sleeves is clearance. They must fit their cylinders closely enough for effective low-speed



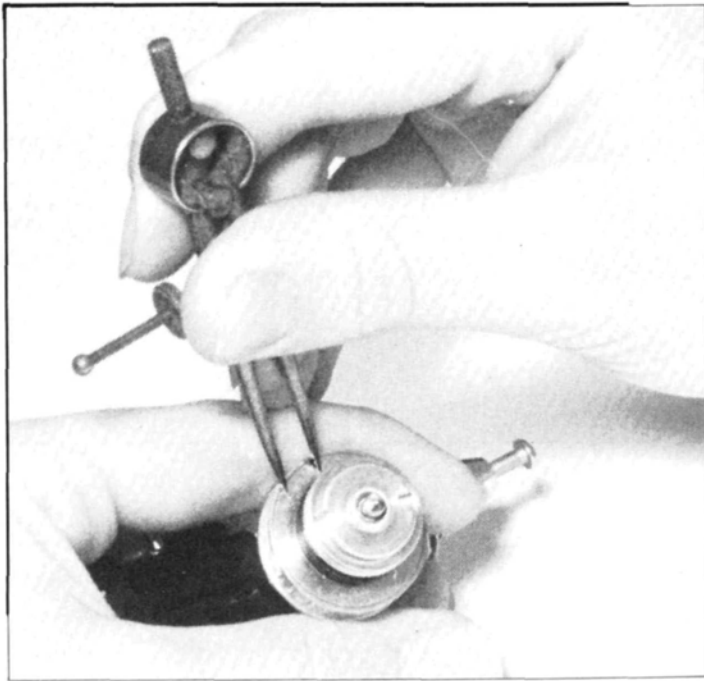
The Cox "Dragonfly" all set up and ready for installation in an R/C model. Its large fuel tank capacity is a big advantage.

operation, but loosely enough to be easily moved by the servo. Many of these sleeves fit well while the motor is at room temperature, but while running, it might get too tight for the pushrod to rotate. The cause is the difference in temperature between the cylinder and sleeve: Being hotter, the cylinder expands more than the sleeve does, and binding can result.

The fix for this latter condition is easy: Lap the sleeve to the cylinder with a fine abrasive, such as toothpaste, until all trace of high-temperature stickiness is gone.

As for the snap-ring actuating arm, it can be extended to a useful radius with a sheet-brass addition to the snap ring. This extension should be a small triangular shape with holes in the inner end matching those on the snap ring. Attachment is with copper wire wrapped through the holes and soldered.

However, a still better solution to both the problems in throttling a Cox .049 reed-valve motor is to replace its steel exhaust sleeve with an aluminum throttle/muffler assembly from a Dragonfly, or use the complete Dragonfly en-



Locating the hole for the throttle pushrod. The dividers are set at just under half the available servo travel.

gine. It's a mighty good little motor for small-size R/C, once it's properly set up, and here's how to do that:

(If your airplane doesn't have room in its nose for the Dragonfly's very large fuel tank, you can replace the tank with an assembly from a Black Widow, a QRC, or a similar Cox .049.)

The Dragonfly motors are shipped with their fuel tanks only partly assembled. You have to finish putting them together, and the toughest part of the job is installing the fuel line. Some of the earlier Cox Hobbies Dragonflies came with a flexible fuel line made of red silicone tubing. This is extremely easy to install, but it slips off the fuel nipple just as easily—often while the engine is running! The newer version comes with translucent silicone fuel tubing. This works very well. However, it's quite difficult to install it onto the fuel nipple inside the tank. Here's how I do it:

I use a giant-size T-pin (known as a wig pin) inside the fuel tubing as a support while I maneuver it onto the fuel nipple. Any similarly stiff and smooth wire (even a paper clip) will also work, provided its diameter is just small enough to enter the nipple. Do the "clunk" end first, to practice. Insert the wire into the tube, wet the nipple on the clunk weight, then push the tubing down onto and over the clunk nipple until it's well-seated past the tapered area. The action is a pushing one: getting the tubing started, then relaxing it and giving another push, and so on, until the tube is worked gradually into position.

On the clunk, this job isn't too difficult, but on the fuel-tank nipple, it's much tougher, because of inaccessibility. I use a pair of smooth-tipped, bent-end tweezers for this job, and it takes plenty of patience! Usually around 20 or 30 "pushes" are needed to fully seat the tubing onto its fitting.

Do this job gently, despite its frustrations, because the thin, flexible silicone is easily damaged by excessive force in handling. Even a tiny crack or a pinhole in it is enough to interfere with the proper running of the engine. Take your

time; be careful! (If you ruin the tube, a spare is supplied with the Dragonfly, and they're readily available from Cox Hobbies.)

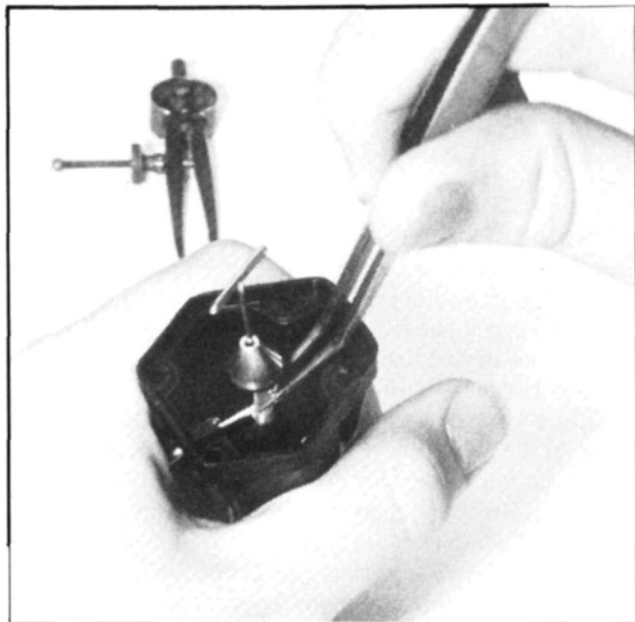
The Dragonfly's throttle/muffler is equipped with the same snap-ring actuator arrangement as I described above. *Forget it!* Instead, operate the throttle via a hole in the outer rim of the muffler ring.

First, decide whether you want your throttle-actuating wire to be on the top or the bottom side of the engine. (The Dragonfly *must* be mounted with its tank sidewinder-style for its fuel-feed system to function properly; its cylinder, however, can be on the side you prefer.) Remove the outer spring-steel band from the muffler/throttle. Assuming that you'll be installing the engine with its cylinder on the right side of the airplane (the way it comes from the factory) and that your throttle-actuating wire will be on the top side of the engine, here's the procedure (change as necessary if you're using different positioning).

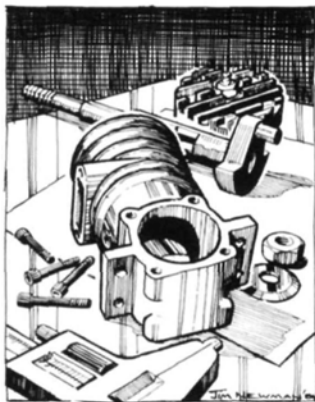
Look into the exhaust port on the top side of the muffler/throttle, and rotate it (counterclockwise as viewed from the head side) until the exhaust ports in the engine cylinder are just barely covered. Hold it in this position.

Now move the engine so that you can sight downward over its head (as if it were in the standard upright cylinder position) and make a mark with a felt-tip pen on the top edge of the muffler/throttle exactly at right angles to the engine's crankshaft center line. In other words, a line

(Continued on page 64)

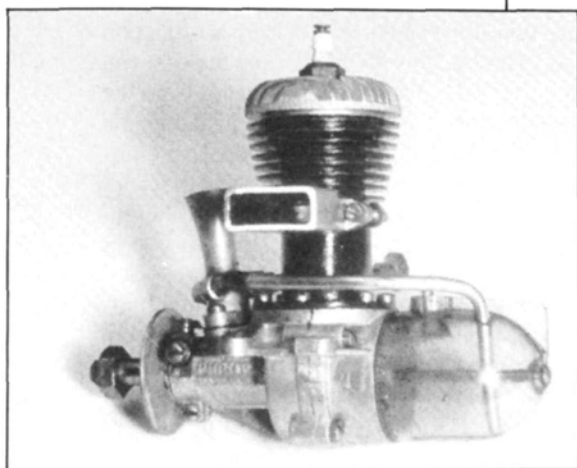


Installing the Dragonfly's fuel line isn't easy, but doing it this way works, given a bit of care and patience.

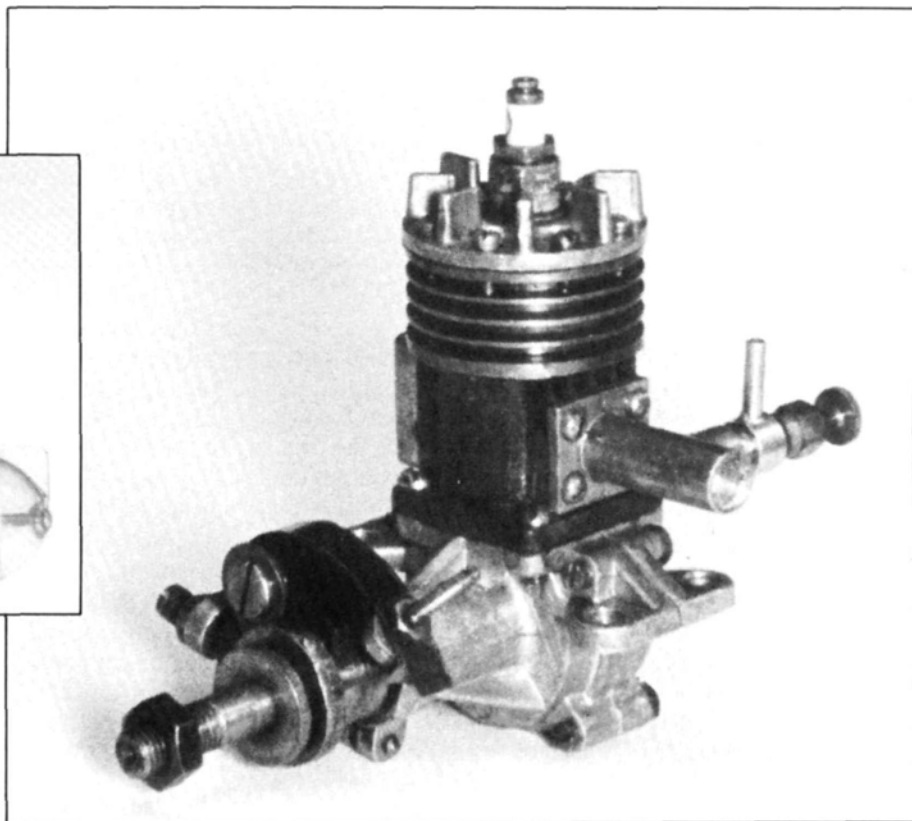


About Those En

by JOE WAGNER



A first-model Phantom P-30, made in 1941. With its sharply swept-back needle valve and timer arm, the P-30 was among the safest front-rotary sparkers to operate.



The GHQ .52 wasn't really the worst model engine ever made. (The "Deezil" was!) This particular GHQ is a prewar factory-assembled motor, and it runs fairly well.

MY "SMALL STEPS" partner, Randy Randolph, asked me an interesting question recently: "With high-precision computer-controlled machine tools so readily available nowadays, why is Cox Hobbies* the only company in the U.S. making 1/2A engines?"

I offered several explanations for this, each of them valid to some extent. After all, during the last 40 years, there have been 15 U.S. manufacturers of 1/2A motors, and the 14 who've dropped out of the game did so for a number of reasons. However, I think there's one fundamental truth about model engine production that's never been sufficiently appreciated, either within or outside the hobby: Its success requires a lot more than just own-

ing precision metal-working machinery and knowing how to use it.

Model engine manufacture is as much of an art as it is a science. The makers must have a genuine feeling for their product if it's to meet the expectations of buyers. A purely mechanical approach to engine production simply isn't good enough, even with the finest available machine tools and materials. Nor has owning an already-proven motor design in addition to well-equipped facilities been particularly helpful to companies trying to make model engines with a strictly by-the-book approach. Again and again, in the hobby industry, an established motor-making operation gets taken over by new management, which then more or less speedily

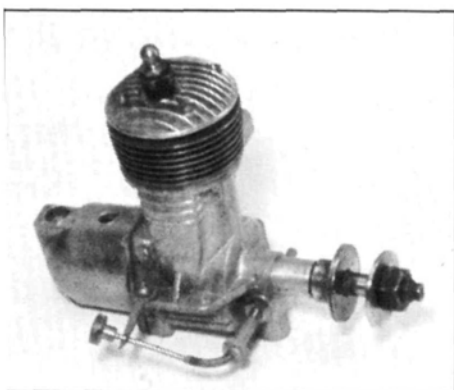
goes broke. Invariably, this comes as a shocking surprise to the new proprietors. After all, the people who *started* the model engine company were mere hobbyist types; rank amateurs at business dealings. Professional managers with a no-nonsense approach should surely be able to run a model engine concern better than hobbyists can!

But, to my knowledge, it has seldom worked that way—at least, not for long. Just about every time a model motor business changes ownership from its originators to others, it soon perishes, because the new engines are noticeably inferior to the old ones.

The notorious GHQ of the WW II era is commonly considered to be the worst

model engine ever manufactured, but the original motor (called the Loutrel, after its designer) wasn't so bad. It did have one major peculiarity, though: It ran a lot better clockwise than in the customary direction. That was probably because its clockwise-turning crankshaft acted as a sort of centrifugal pump to force the fuel/air mixture through the Loutrel's complicated bypass arrangement (which the GHQ inherited).

The first GHQ engines were reasonably well-fitted and assembled—for that era, anyway; and they ran at least as well as, say, Sky Chiefs and early Baby Cyclones. But when the manufacture of these engines was taken over from the "hobbyists" who had started the business and put into the hands of more "professional" people, the GHQ rapidly became a byword for sheer junkiness. The reason these poor "engines" stayed on the market as long as they did (10 years) was that they were the only model airplane motors available throughout World War II.



One of the very last Bullet motors ever made with an Arden glow plug installed. Atwood-built Bullets were fine runners, unlike this hastily built specimen.

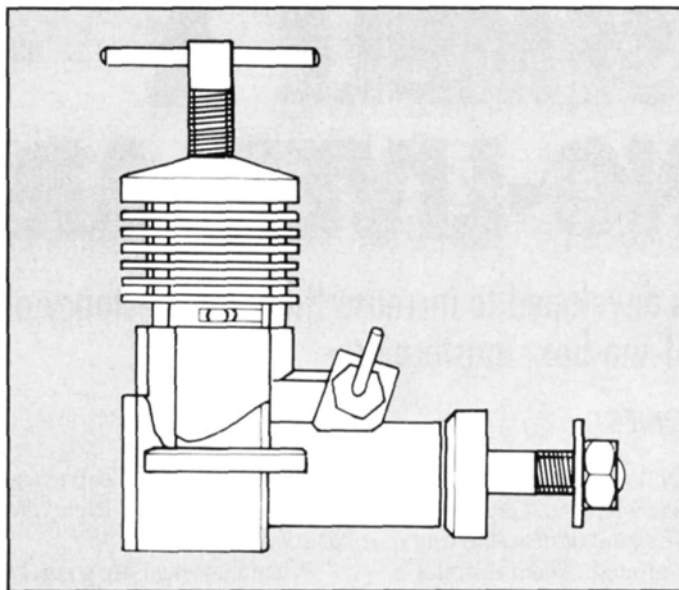
After the war, the same fate befell other good-quality prewar model engines. Having no true feeling for their products, but just a desire for profit, the postwar mak-

ers of motors such as the Bullet .275 and Phantom P-30 (both originally Bill Atwood designs) let quality slip severely. As a result, within a year or two they were out of business.

Even the best intentions of new model engine company proprietors won't help if they don't have an instinctive feeling for what makes model motors tick. Deep familiarity with the actual use of these miniature powerplants is of vital importance if they're to be manufactured successfully. As an illustration of this, I just received word from Eric Clutton* (U.S. importer of British model diesels) that the recently resurrected D-C line of English miniature diesel motors isn't available anymore. That famous old Davies-Charlton make, which was highly successful for many years while produced by its originators, has now failed twice under new management.

The latest company (Quickstart), despite being equipped with the most modern computer-controlled machine tools, seems to have had no better luck at model engine manufacturing than the previous one, which went bankrupt three or four years ago. It's a shame that such well-liked motors as the pretty little .03 Dart have again become unavailable, but, as I've already explained, this isn't unusual.

In contrast, however, there's the example of the Progress Aero Works (PAW) diesels, which Eric Clutton imports and sells by mail order. These exceedingly high-quality model motors have been



All P.A.W. diesels look about the same, regardless of displacement. The only way to tell this is a drawing of the .049 is the relative size of the contra-piston screw.

made by their original designers, Tony and Gig Eifflander, for over 30 years. Each year, they seem to get better, too; the newest dual ball-bearing PAW .15 diesel rivals the performance of the world-record-holding Nelson .15 glow engine, but it sells for about a quarter of the Nelson's price.

PAW diesels come in all sizes from .049 through .35, and in both throttled and unthrottled versions. Eric's latest catalog lists 26 different PAW models, even including ball-bearing .049s and .06s in both R/C and "standard" types. I know of no other ball-bearing model engines this tiny! One other unusual feature of PAW motors is that every one, including the 1/2As, is test-run at the factory before shipment.

Returning to Randy Randolph's question about why Cox is the only U.S. maker of 1/2A engines: They once almost vanished into the same limbo as earlier "take-over" victims in the model motor business, then, several years ago, a conglomerate called Leisure Dynamics bought up successful American model companies, in what seemed to be an attempt to corner the market. Their major purchases included K&B*, Airtronics*, and Cox.

This venture failed, mostly for the reasons I've just described. Luckily for modelers, though, the individual companies bought by Leisure Dynamics didn't die when it went bankrupt, but were re-purchased: K&B by its original founder, John Brodbeck Sr.; and Cox Hobbies by one

(Continued on page 76)

ASSEMBLE A LONG-LIVED ARF

Techniques developed to increase the life expectancy of your out-of-the-box masterpiece

by MARK JONES

EVER SEEN WHAT happens to an ARF fuselage when the wing pops off in the air? It's kind of neat, the way it barrels into the ground! And if the pilot is so shocked that he forgets to throttle-down—that's even better (unless, of course, it's *your* airplane!). If it's *your* plane, you're out a couple of hundred dollars, or maybe more, depending on which brand of ARF you bought and how badly your radio and engine are damaged. I should know: I dumped my .45-powered shoulder-wing job on about its fifth flight. I was eating up the sky—showing off for some of the better fliers in our club—when the wing fell off and started to autorotate slowly to the ground. Someone in the crowd laughed and yelled, "Give 'er some up." I cut the engine and tried to stop the fuselage from spinning with the rudder, but it didn't seem to make much difference. The fuselage hit and blew into so many tiny pieces that I didn't even need to clean up the mess!

Anyone who has put more than one kit

together knows darn well to use epoxy on the joints that count. Right? Wrong! Not on *all* ARFs.

When I checked my wing, I found several possible reasons why the bolts pulled through. The epoxy I used to glue the plywood support for the hold-down bolts didn't stick. I went back to the assembly instructions and discovered that I should have used CA around the edges between the Mylar covering and the plastic wing-joint covering. They didn't tell me to use CA to glue the plywood support down, so I used epoxy as I would have for a kit plane. Also, the hold-down bolts were too far back, and the washers actually hung over the edge of the support. And finally, there wasn't enough glue between the plastic cover and the wing: The cover almost fell off in my hands when I pulled up on it to inspect the damage.

I talked with several other modelers about their problems with ARFs and the possible solutions to the problems, and I decided that an article telling modelers

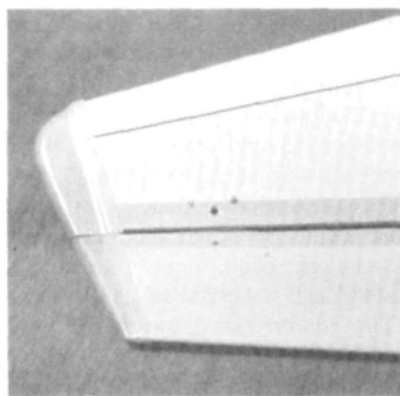


Use silicone caulk where the fuel tank goes through the fire wall.

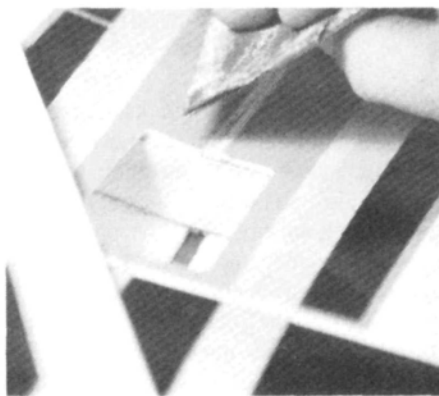
about the special construction techniques needed to assemble ARFs was a must.

The research I did for this article included talking to representatives of several manufacturers and distributors. Every company that I talked to, with one exception, acknowledged they had a problem with (some even said they had *replaced*) planes that fell apart because they weren't put together correctly. Some have more of a problem than others, and I'm convinced that the ones with the *best* instruction packages are the ones who receive the fewest complaints.

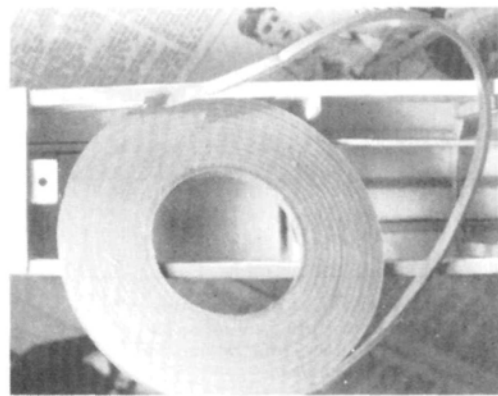
However, the problems that abound in the ARF industry aren't limited to poor instructions and improperly assembled airplanes. I promised to mention that a jig-assembled airplane won't be put together like a kit you've assembled yourself. This is true whether it's an ARF with the Mylar/foam combination covering, an ARF



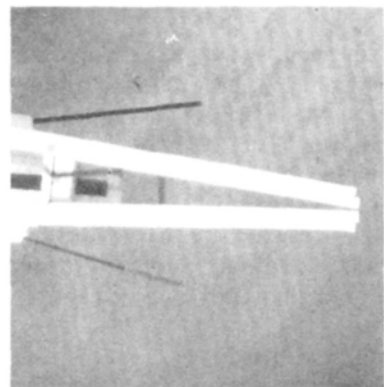
Drill holes for toothpick hinge pins from the underside of surfaces. Be careful not to drill through the top surface.



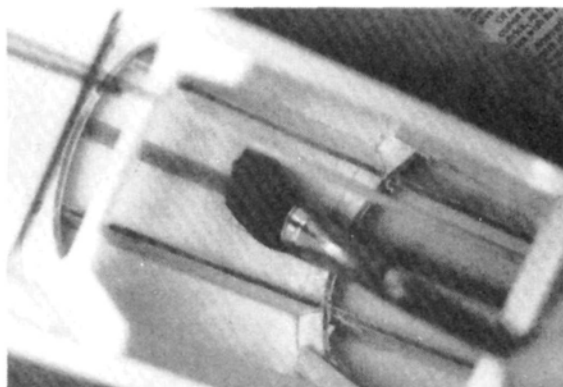
Sanding the Mylar before you glue on the plastic cover helps the glue do a better job.



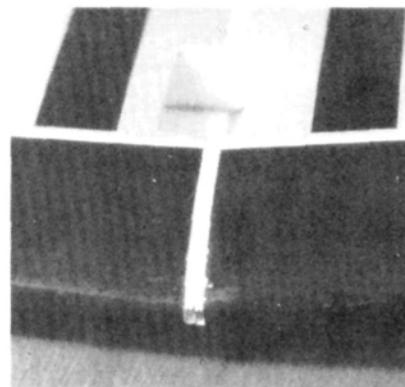
The wing saddle on this airplane was as wavy as the manufacturer could possibly make it. Self-stick foam tape sealed the gaps.



Build and install Y-type pushrods before you glue on the horizontal stab.



Coat the radio and engine compartments with a good fuel-proofer.



The two wing halves should fit together as closely as possible.

with a more conventional shrink covering, or an almost-ready-to-cover airplane. This means that before they buy an ARF, old-time modelers should realize that the wing joints won't have glue fillets, the parts fit will probably be loose to allow for adjustments in the jig, and there won't be as many parts as they're used to seeing. It *doesn't* mean that modelers should accept anything *less* than the highest quality current technology can provide. The ARF industry is growing fast, and the only control consumers have is to be selective when they buy.

Back to the construction tips I promised. To make sure I give you the best advice possible, I talked with the following people: David Anderson, marketing manager for Royal Products Corporation; John Greenshields, Hobby Shack's mail-order sales manager; Joe Williams, assistant manager at Indy R/C Sales; Frank

Bachenheimer, former marketing manager for Carl Goldberg Models; and Sunshine Hobby. I also talked to as many modelers as I could, and the following construction tips are a compilation of what I learned.

The Wing

If the dihedral brace is too long and won't let the root ribs come together, trim or sand the brace a little on each end so that the two wing halves come together tightly. Use plenty of glue on the root ribs, the spars and the dihedral brace. (Epoxy is still best for joining the wing.) If the ribs are warped (sometimes plywood ribs warp) use clamps to pull them together, or fill any cracks with scraps of wood covered with epoxy.

Still not satisfied with the center joint? Wrap it with fiberglass tape as you would for a kit plane. When you put the plastic wing-joint cover on, cut or trim it to fit as tightly as you can. Sand the Mylar almost to the edge of the plastic. Use thick CA to glue the plywood wing hold-down plate (if the airplane has one), and use thick CA all over the plastic cover. When the cover has been glued down, go around the edges with CA.

When you drill holes for the wing hold-down bolts, measure where they should

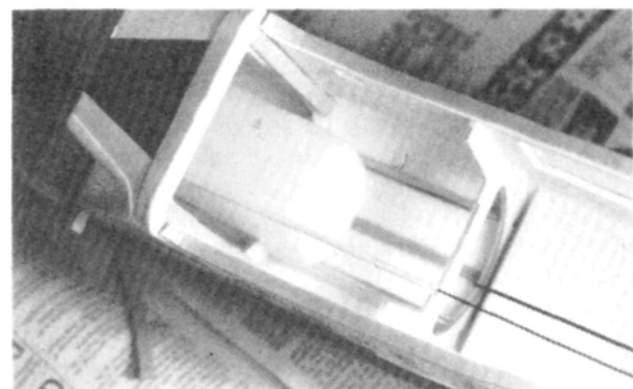
go. Sometimes, the dimples pressed into the plastic cover aren't in the right place, and if you have to enlarge the holes because they aren't where they should be, you'll have to use large washers so that the bolts can't pull through the holes. The closer the hole is to the bolt size, the better. It might not be a bad idea to use larger washers than the kit comes with anyway, just to be sure.

Foam wings can be made stronger by using a router or a knife to cut a long slot in the bottom and then epoxying a wooden brace into the slot. Shape the brace to match the dihedral of the wing, and fill where you need to with Goldberg* Model Magic.

The Fuselage

Use silicone caulk to fill any cracks or holes that fuel could get through. Caulk around the vertical and horizontal stabilizer, around the fuel line and the throttle pushrod where they come out of the fire wall, and put a thin layer of caulk on the wing saddle with your finger. If there are large gaps between the wing and the fuselage, use closed-cell foam insulating tape as you would for a kit plane. In addition, be sure to coat the engine compartment and radio compartment with Titebond or a comparable product to protect against fuel damage.

Don't be afraid to trim one side of the horizontal stabilizer platform, or shim up the stab if it needs it. If your plane uses plastic covers around the stabilizers, triangle stock will usually fit around the stab under the cover. Use it, even if you have to trim the stock to get the cover on. Trim the covers to fit as closely as possible, and



I trimmed the fuselage former so I could wrap the fuel tank with foam. Note the plywood reinforcement strips glued to each side of the former.

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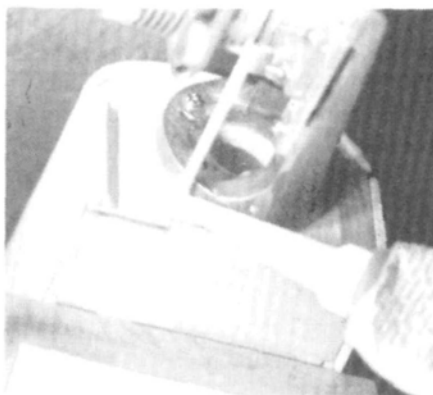
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LONG-LIVED ARF

glue them in the same way as you did the plastic wing-joint cover: using thick CA under them and regular CA around the edges.

Some ARF airplanes make use of a split pushrod for the elevator. What a pain in the neck! If you put the horizontal stabilizer on before you make and install this pushrod, you have to be a sorcerer to get the darn thing in. If, however, you put the pushrod in before you put the horizontal stabilizer on, you can reach right down in there and guide the two wires into their prospective positions.

While you're at it, use fine copper wire



Caulk around pushrods and fuel lines where they go through the fire wall.

or strong string (use carpet thread) to wrap the ends of the wooden dowel where the wire pushrod is attached. (Wrap it nice and tight like fishing rod wrapping.) Then coat the area with epoxy. After I wrecked my first ARF, I noticed that the shrink tubing that came with the kit for this purpose was splitting down the sides. I don't know how long my pushrods would have lasted, but this old-fashioned method is tried and true. Also, check the fuselage for proper alignment, because even a jig-built fuselage can sometimes develop twists.

It seems as if everyone knows that a fuel tank mounted directly to the airframe will vibrate and cause the fuel to fill with air bubbles. So why do so many ARFs come with extra-large fuel tanks that mount directly to the airframe? Must be one of those philosophical questions that are impossible to answer, but there are two things you can do to ensure that your fuel is bubble-free:

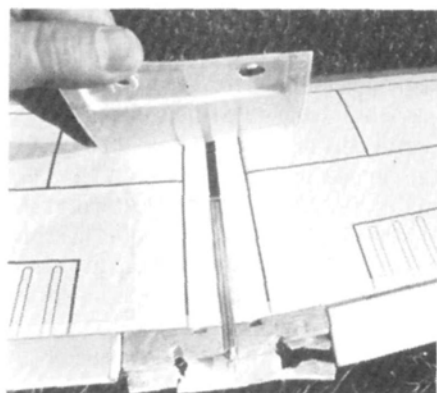
- First, you can use a smaller fuel tank or

one of a different shape so that you can wrap it in foam and still get it into the fuselage.

- Second, you can trim enough wood away from the fuselage formers to allow for foam around the fuel tank that came with the kit. If you choose to trim out the formers, make sure you reinforce them by gluing strips of plywood down their sides.

Coverings

In extremely hot weather, the polyester shrink coverings on some ARFs sometimes loosen and wrinkle, and no matter how hard you try, you can't shrink out the



This is the wing that fell off. The hold-down bolts pulled right through the plastic cover.

wrinkles. Super MonoKote* will stick to these coverings, so you can use it to repair your airplane by cutting out the offending area and following the directions included with the Super MonoKote. Perhaps you should try the MonoKote somewhere that can't be seen before you do any cutting.

The Mylar/foam coverings are difficult to repair; however, most of the manufacturers included a piece of the covering and instructions on how to use it to patch, if needed. You simply cut out the damaged area and cut a patch to fit it as closely as possible. Basically, you have to remember that most CAs dissolve the foam, so use epoxy or silicone adhesive to glue patches in. (Editor's note: The possible exception here is the new "UFO" formula CA from Satellite City*. It can reportedly be used directly on foam with no adverse effects.) The epoxy works here because it glues the foam, *not* because it sticks to the

(Continued on page 89)



Basics of Radio

by RANDY RANDOLPH

MODEL AIRPLANES THAT are replicas of full-scale aircraft appeal to everyone. The clean, light planes of today and the glamor planes of the '30s, as well as the military birds of WW I and WW II, hold a charm that's easy to understand. A good example of a scale model at its best is this Stearman by Gary Pannell, which is an exact reproduction of one that Gary owned and flew for a number of years. Gary is an expert R/C pilot who has flown just about all categories of competition from Pattern to Racing, and that's what it often takes to fly a scale airplane!

In the early days of modeling, when balsa wood was becoming the main construction material and all models were free-flying, most of the kits offered by manufacturers were rubber-powered models of full-scale aircraft. There were a few exceptions, such as the competition types that were designed strictly for endurance, but, by and large, scale model kits predominated. Most of the kits were proclaimed as "A Flying Model Airplane" and, in truth, they could be made to fly a little, but the flight the average model achieved was more like that of a butterfly



Is the pilot in the cockpit, or on the ground with a transmitter in his hand?!

than an airplane!

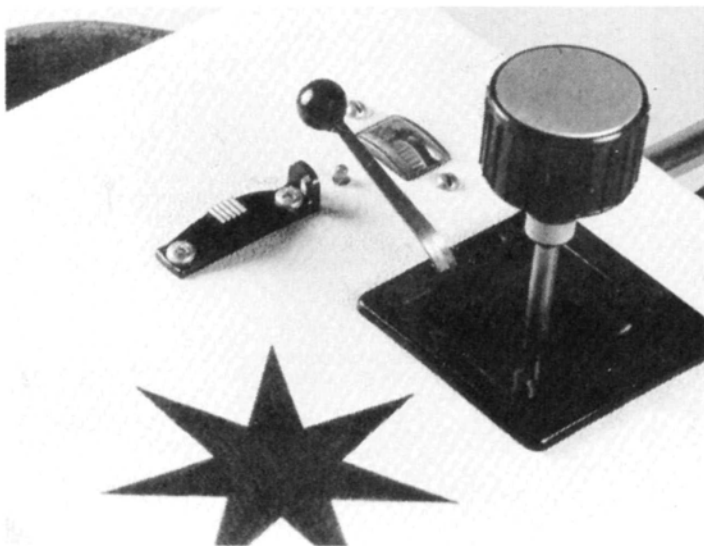
With the development of the gas-powered model-airplane engine, scale-type models started to lose their attraction for sport modelers. The reason was simply that a gas-powered model airplane represented a large investment in time and money, and scale models of contemporary aircraft didn't fly well enough to justify the investment. They just didn't *last* long

enough! Gas power was the way to fly models, and the emphasis was on flying, not building and rebuilding.

Just before WW II, U-control made an appearance and, because of the stabilizing effect of the wires and the ability to control the attitude of the aircraft, scale models regained some popularity. They could be made to fly satisfactorily when they could be controlled, but the "sport model" prevailed because it flew better and, after all, flying was the whole idea!

In the early days of R/C flying, practically no consideration was given to scale models at all. The radio equipment was crude and unreliable, and only the rudder was actuated by the radio, so the model had to be able to care for itself most of the time. This called for a stable, free-flying airplane and scaled-down full-size airplanes just wouldn't work. As the radio equipment improved, the ability to fly scale-type models also improved and, as in U-control, they've now become an integral part of the R/C hobby.

Scale airplanes in the form of ARF (Almost Ready to Fly) kits exert a lot of pressure on the new flier. They're attractive, easy to assemble and offer a finished



This transmitter has been customized to fit a specific need—maybe yours!

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product that gives a great deal of satisfaction to the owner, but they *aren't* easy to fly. In the hands of an experienced pilot, they perform very well. In the hands of a novice, even with an instructor, the success rate can be rather low. Everyone should build and fly at least one scale model, but *not* for a first airplane. Once flying skill is achieved, the sleek beauty that has been a dream for years can become a reality.

The picture shows a very interesting modification to a single-stick transmitter made by Joe Wagner. Invariably, single-stick transmitters have the throttle control on the right side of the transmitter. This makes it necessary to cradle the transmitter on the palm and wrist of the left hand, so the fingers of that hand can control the throttle lever—a rather unnatural position for a right-handed person and almost impossible for someone who's left-handed. Granted, a lot of people have mastered this system, but it has never been a popular arrangement.

That extra lever and knob on Joe's transmitter is the throttle. By shifting the elevator trim to the opposite side and utilizing the slot left vacant for the throttle, the transmitter is made operable from a tray, or by someone who's left-handed. The throttle pot must be relocated to the left of the stick, and a simple right-angle bracket can be used to mount it in its new position. The new, longer throttle arm is attached to the old arm, routed through the trim slot, then bent to a convenient position.

So arranged, the throttle can be reached easily by the fingers of the hand that operates the stick. The other hand is now free to hold the transmitter in any way in which the flier feels comfortable. This modification will be different for various makes of transmitters, but the principle remains the same. Transmitters so modified might well be the answer for left-handed modelers who have trouble adapting to standard Mode II transmitters. ■

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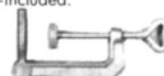
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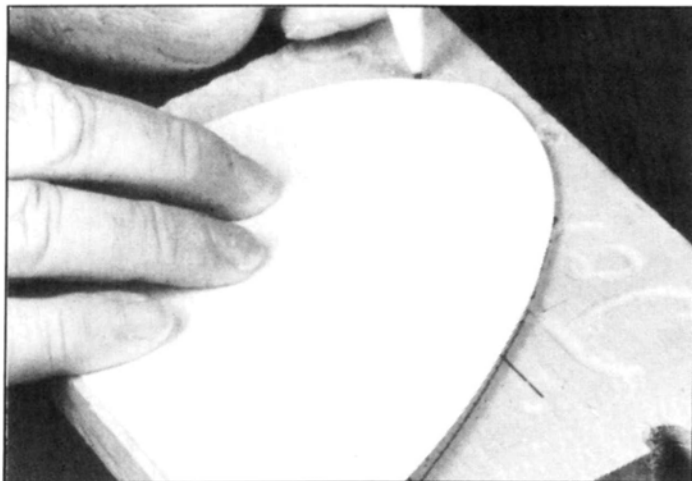
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Laminating curved wing tips

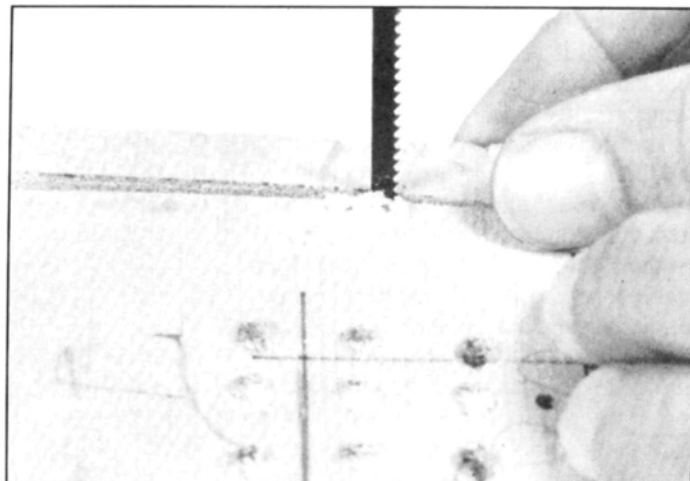
TECH TIPS

Elliptical wing tips add style and charm to an otherwise monotonous constant-chord wing. During the Golden Age of aviation almost all airplanes, from ultralight to military, had this type of wing tip. They aren't difficult to make, are very strong, and do change the look of a square box airplane. The last two bays of the wing are usually replaced with the elliptical tips. The photos show the way.

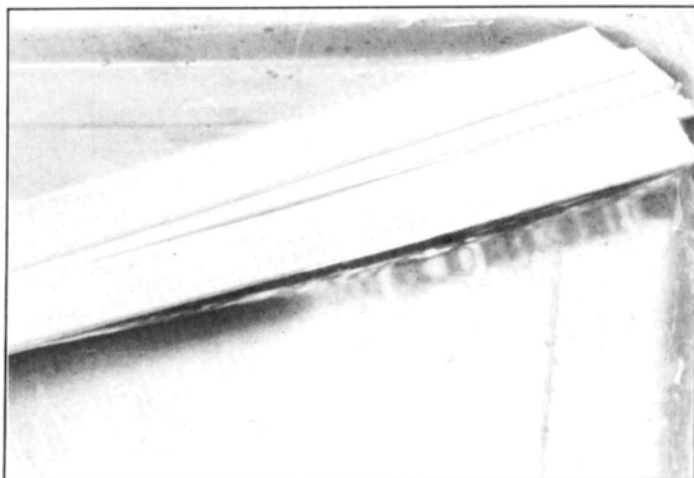
by RANDY RANDOLPH



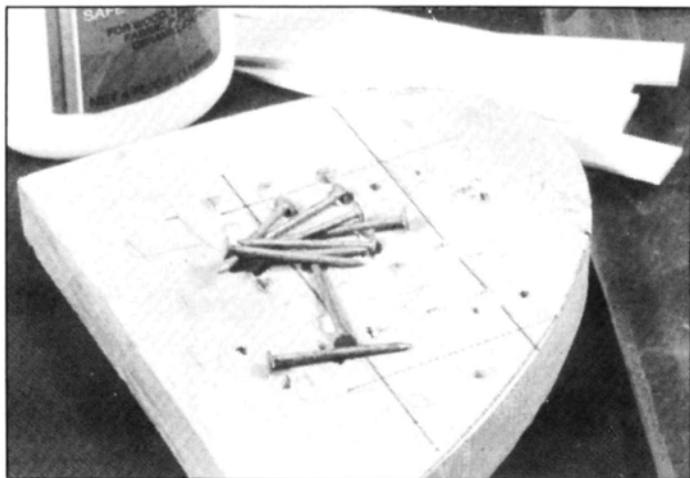
1. Make a card-stock template of the inside shape of the tip. The complete tip should be at least $\frac{1}{16}$ -inch wide for every 2 inches of wing chord. Trace the template onto a piece of scrap 1-inch-thick board.



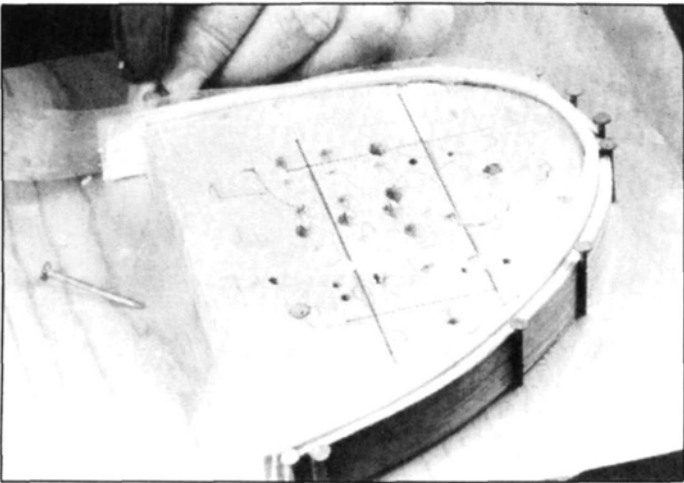
2. Follow the lines and saw the tip jig from the scrap board. It's important that the sides of the jig be vertical. The best way to do this is with a band saw or a jigsaw, but a coping saw can be used if the edges are checked with a right-angle gauge.



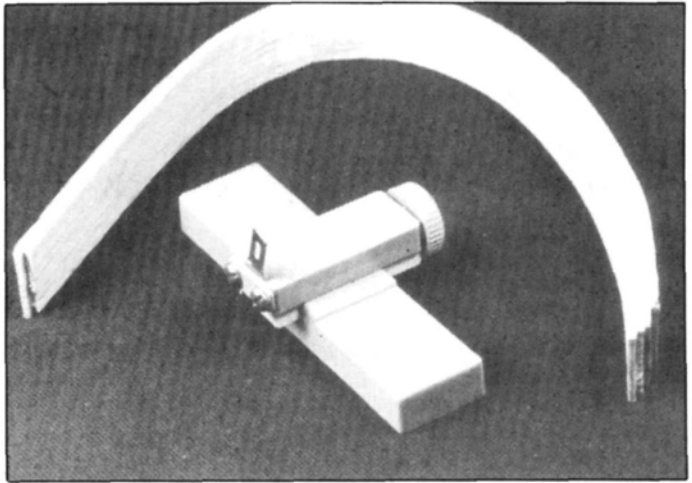
3. Slice a 1-inch strip of $\frac{1}{16}$ -inch medium-soft "A"-grain balsa for each 2 inches of wing chord and soak them in a pan of water for about 30 minutes. The strips should be long enough to go around the tip jig with about 3 inches to spare. (A little clear ammonia added to the water will help.)



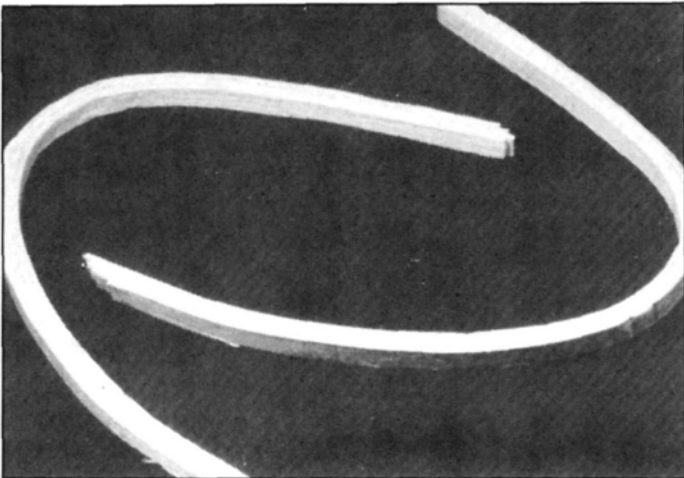
4. The tools and materials needed for the actual forming of the tip are: the jig, the well-soaked balsa strips, some waxed paper or plastic film, white glue, nails and a hammer. Another piece of scrap board will be necessary as a base for the jig.



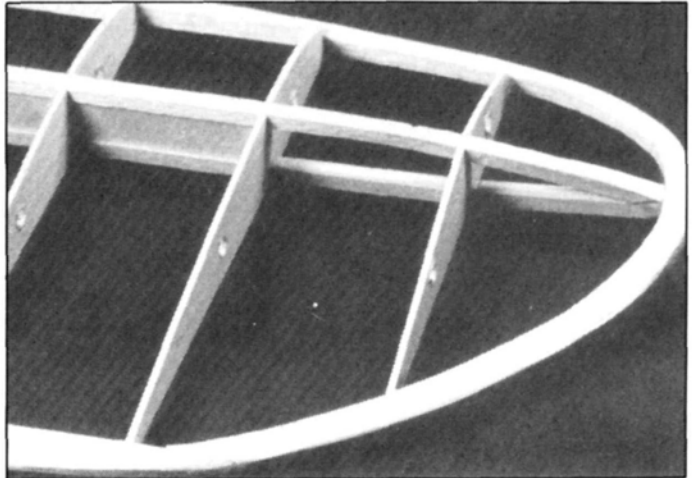
5. Place a piece of waxed paper over the base and nail the jig to it, cut a strip of waxed paper to fit around the edge of the jig. Paint all surfaces of the balsa strips with a mixture of 50/50 white glue and water, stack them side by side, and starting at one end of the jig, mold them around it. Drive nails into the base wherever necessary to hold the stack against the jig.



6. Allow 24 hours for the strips to cure, then remove the formed bow from the jig. Cut the 1-inch-thick bow in half to provide a bow for each wing. This can be done with an adjustable stripper, a razor knife, or a saw.



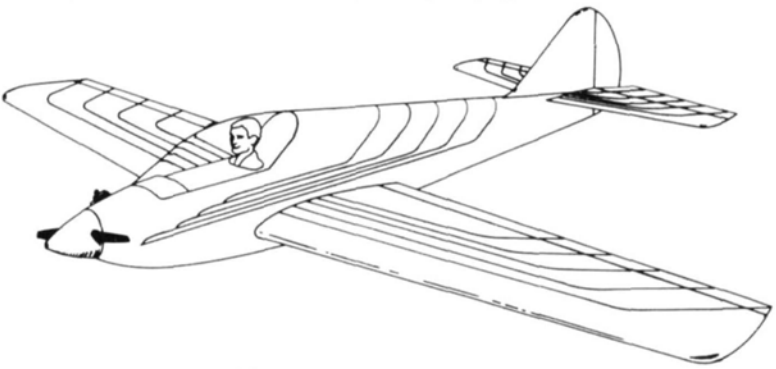
7. Sand the roughed-out bows to smooth any rough areas and trim to size. They should be the same thickness as the leading edge. Final sanding will be done when they're on the wing.



8. The complete wing tip. Trim the bows to fit between the leading and trailing edges as shown. If they're replacing a square tip, deepen the spar notches in the last rib and trim the rib to blend with the new tip.

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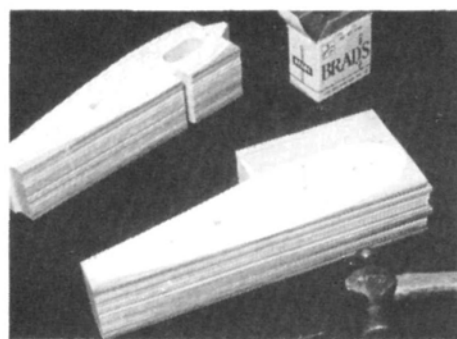
Building Model

by JOE WAGNER

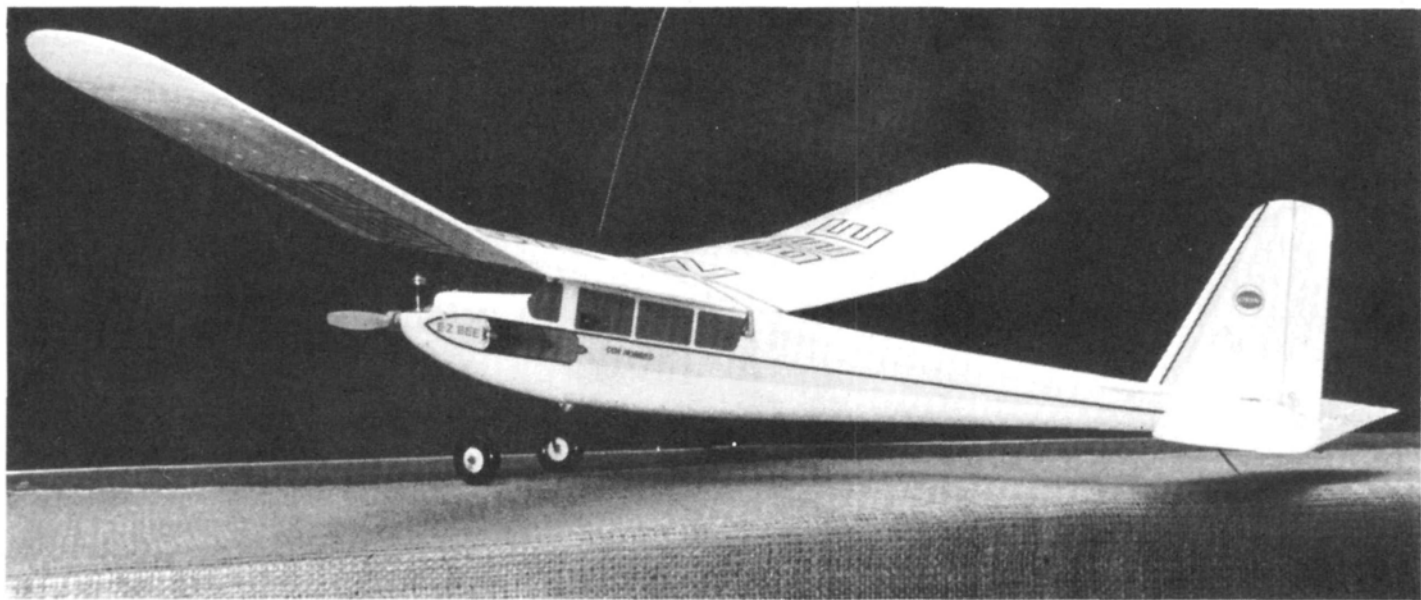
ALTHOUGH THIS MIGHT be hard for ARF fans to believe, during the 75-plus years our hobby has existed, *building* models has always been more popular than flying them. If you doubt that this holds true today, consider the many thousands of *scale* kits Guillow and Comet sell each year; the number far exceeds the number of *R/C* kits sold. But not one out of a 100 model airplanes constructed from Guillow kits is ever flown. Most of their purchasers don't even *intend* to try to fly the completed

radio systems, etc.). But our need to be creative requires something more than just buying ready-to-use equipment. It's far more satisfying to say, "Look what I've built!" than, "See what I've bought."

The "personal touch" is very important, too. Even when you decide to buy an ARF plane, the chances are that not everything about it appeals to you. If so, why not change what you don't like? It's your airplane, and you can do whatever you want to it: modifying this, removing that, replacing the other....



Making multiple wing ribs. The rear stack has its ends, one spar notch and a center lightening hole sawed to shape. In front, another pile of rib blanks is being nailed together for sawing.



Even ARFs can benefit from model-building techniques, as this customized Cox EZ Bee shows. Its looks and flight performance are both much improved.

airplanes, and that means they're buying all those kits just for the pleasure they get from model building.

Of course, few people would want to construct a model out of, say, a rough balsa log, doing every bit of cutting and shaping by hand. That would be drudgery rather than fun. The prefabrication of items like tapered trailing edges, pre-bent landing-gear wire and molded-plastic cowlings adds to the enjoyment of building, as does the availability of the many ready-to-use items we're so accustomed to being able to buy (engines, fuel tanks, wheels,

As an example, I recently bought an all-foam ARF kit from Cox Hobbies*: the EZ Bee. While the design had many good points, some of its features didn't appeal to me much. I disliked the plane's square-ended wings and tail and its short aft fuselage, so I changed them. I added rounded tips to the wing, reconstructed the fuselage behind the cabin, and made a whole new lightweight sheet-balsa tail.

I ended up with an excellent-flying and different-looking airplane. It's obviously still an EZ Bee, but it contains enough of my own creative ideas to make it "my"

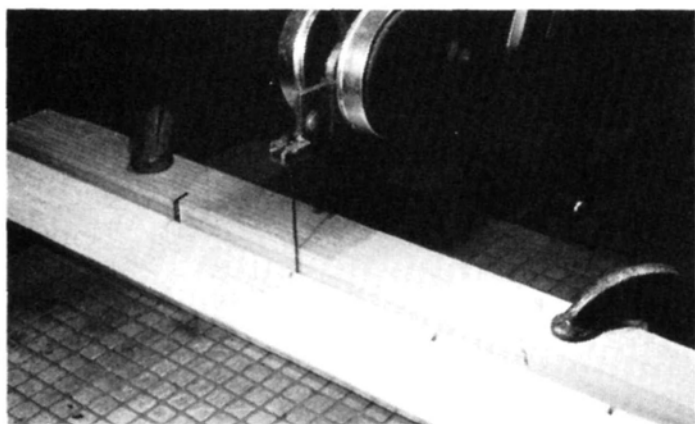
model instead of just another off-the-shelf product.

Winging It

Building wings is the least-favorite task of most modelers: There are so many parts to cut out, fit and glue together! However, to fly, airplanes have to have wings. Some can be bought ready-made, but the lightest, strongest and cheapest model wings are those that you build yourself. Let's look into some fast, efficient ways of accomplishing the job.

Recently, I constructed a built-up rec-

Airplanes



Notching trailing edges the easy way. The "fence" controls notch depth, while the small "index stop" at left does the spacing. (It's a strip of sheet metal snugly fitted into a saw slot in the fence.)

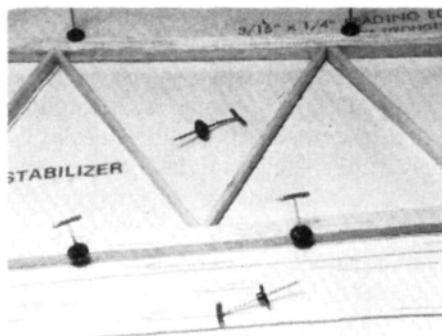
tangular wing (56-inch span, 8-inch chord), and its only prefabricated part was the tapered trailing-edge stock. That wing was ready to cover in just a single evening! It went together quickly, because I carefully pre-cut all the parts to fit precisely.

Ribs come first on my agenda. I photocopy the rib pattern from the full-size plan, and contact-cement this to a rectangle of scrap balsa slightly larger all around than the rib dimensions. I rough-cut enough similar-size blanks of balsa sheet for all the ribs, plus one or two extra in case I ruin one during assembly. Stacking all the blanks up with the pattern piece on top, I nail the pile tightly together with two or three long brads. (Pins don't work well for this: The rib stack can distort too easily while being sawed to shape.) I use a flat, steel "anvil" underneath when I do the nailing, and I drive the brads with light hammer strokes until I feel their points hit the metal. This "mushrooms" the brad points just enough to lock the blanks tightly together, making it easy to accurately saw and sand to shape. Finally, I clip the brads off and file their ends flush with the top of the rib stack, so that they won't snag on the saw's hold-down.

My favorite rib-cutting tool is a fine-tooth saw-blade in my Dremel scroll saw. I cut the spar notches first, fitting them as closely as possible to a piece of the actual

spar stock I'll use later when assembling the wing. To ensure an accurate fit, I saw the notches a little undersize, then enlarge them by "nibbling" with the scroll saw and sanding with a manicurist's emery board until the spars just slip into place.

In cutting the rib outline, I again saw slightly oversize, then carefully sand the stacked-together ribs to the exact airfoil contour. That smooths the rib edges and makes sanding the assembled wing un-



Rocket City's Pin Clamps in action. Using these makes it unnecessary to pierce (and thus weaken) slender parts like these stabilizer spars during assembly.

necessary. Last, one by one, I carefully work the ribs off their brads, and then they're all ready for assembly.

I like tapered trailing-edge stock for my model wings, even though the V-shaped sheet-balsa-type of trailing edge (such as Randy Randolph often uses in his

designs) may be a little stronger and lighter. However, solid balsa tapered trailing edges allow notching, and this provides positive spacing and vertical alignment for the ribs.

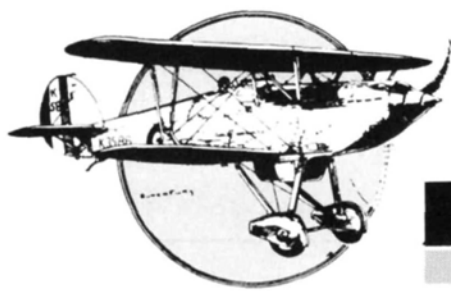
Accurate notching is easy with a simple jig I made for my Dremel saw. One notch is cut "freehand" at the left end of each trailing-edge piece; then the "indexing strip" on the notching guide automatically spaces all the others.

I seldom use dihedral joiners or braces anymore. Years ago, I found I could build model wings more easily and accurately by pre-assembling the spars to their proper dihedral angle, then constructing the wing panels one at a time onto the "pre-dihedralled" spars. Building wings this way has the additional benefit of avoiding the stress concentration caused by joining wing panels with stiff plywood dihedral braces. (A ply-reinforced model wing joint rarely breaks, but spar failure just *outside* the plywood can occur—often at a lower load than if the ply had been omitted. A little flexibility in a wing center section allows stresses to be distributed instead of localized at a rigid junction.)

I assemble my wings on the traditional flat softwood building surface (an old drafting board; something not easily found nowadays). The best readily available building board material is luaun plywood, which is soft enough to stick pins in easily, but firm enough to hold the pins securely.

You can buy an inexpensive, luaun, ply-surface flush door at most home-improvement centers. Sometimes, they sell blemished doors very cheaply (doors with one side scratched, or with a separated ply). A flush door is an excellent model-building table because it's flat and free from warps, and it stays flat, too. However, if you need a smaller, more portable surface for model building, you can buy a 4x8-foot sheet of 5mm luaun ply for under \$10 at any lumber yard, and they'll cut it

(Continued on page 104)



Fifty Years Ago

by LYNNE SEWELL



"ARE WE BURNED UP!" So wrote "The Instructor" in the May '39 issue of *Model Airplane News*. The reason for this outburst? Someone had dared to suggest that aeromodeling "doesn't teach sportsmanship," and that you'd all be better off playing baseball! The Instructor's short, but vituperative, rebuttal left readers in no doubt that for good-natured sportsmanship you need look no further than your local modeling club. "Did you ever see rivals in a chess tournament assist each other with the moves?...Did anyone ever see rivals help each other start their cars on the Indianapolis Speedway?... Sportsmanship, did you say? Model airplane building is permeated with it: nowhere

have we ever seen those who lose accept defeat with such good grace and congratulate the victors with such sincerity!...To our national contest comes a chap from California, another from Florida. The West Coast entrant breaks his spark plug, and the first to offer another is the Florida fellow. So what happens? The California flier sets a new gas record!...That's no isolated example...And we think it's swell! We'll bust the first guy in the nose who says it ain't!" The column ends with a brief note from the editor: "Now isn't that a fine sporting attitude!"

The cover of this issue shows the Lockheed XP-38 pursuit plane, and Robert McLaren's article tells how to build a model of the "bomber catcher" that was startling everyone with its speeds of up to 420mph. After a breathtaking coast-to-coast dash, its pilot, Lt. Benjamin S. Kelsey, crash-landed on a Long Island golf course and emerged "frenzied and incoherent" and "suffering from extreme nervous shock, *not* a direct result of the accident." This prompted McLaren to quote a colonel in the Medical Corps who asserted that "the XP-38 is without peer among the nations...the fastest and most potent fighting machine ever created. But, unfortunately, its operation at full throttle over extended periods will be a physical impracticality, for no flying officer will be able to withstand the amazing acceleration, high speed and mental problems the ship presents." So would the "world's deadliest fighter" prove to be just as

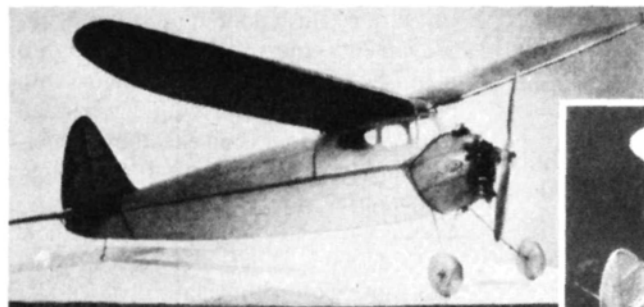
deadly to the gallant pilots who flew it? Readers of *MAN* were warned of potential problems.



A fine Curtiss Hawk.

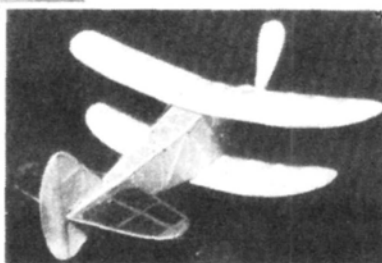
In "Building the Bee," Louis Garami provided the plans and information necessary to build a "high-performance, small-engine, simply built gas model." Ready to fly, the Bee weighed 21 ounces, had a wing area of 380 square inches and a wing loading of exactly 8 ounces per square foot. Claiming a "phenomenal efficiency" for this model, the author says that although small models like this usually require expert workmanship because of their "light and complicated structure," this one would be really *easy* to build. "Basically, it's composed merely of two longerons disposed side by side horizontally, with 1/16-inch balsa sides cemented to them. These sides are then curved over the top and around underneath the ship until they join above and below the longerons...This type of construction cannot be surpassed for simplicity and strength."

Louis Garami also tells readers how to build the "Biplane Sportster," which was "just what the doctor ordered for ailing ambition, rusty razor blades and dried-up cement"—a small biplane with the "umph" of a full-size model, and it "takes off from the ground"! The biplane's framework was covered with colored tissue that should be coated with "light dope or banana oil." I dare you to ask for the banana oil at your friendly local hobby store! And the power source for this beauty?—Six strands of lubricated rubber! Try it out indoors, giving it "50 turns" to start with, and then, outdoors, winding



The completed 21-ounce Bee ready to go places.

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it to capacity: 180 by hand; 350 by win-
der. Must have taken a *superhuman* kind
of patience!

The writer of the regular "Air Ways"
column mentions that, as spring ap-
proaches and modelers start to come out
of the woodwork—er, basements—we
should ready ourselves for sightings of the
wonderful products of winter. A particu-
larly good photograph from Ed Oates, of
Thompsonville, CT, showed his impres-
sive Curtiss Hawk, which was made of
white pine and beautifully detailed. This
modeler was also complimented on the
clarity of his photograph: The model was
photographed indoors without "any other
artificial light" and posed on a box cov-
ered with light-brown wrapping paper,
which also formed the background. A 10-
second exposure captured the results of
Ed's two years in the basement! Good
photographs are just as important today,
if you want to share your masterpieces
with *MAN* readers. A picture from Ger-
many showed a justifiably proud modeler
holding his scale Heinkel He-70, which
had retractable landing gear. After being
hand-launched with the landing gear
locked in the "up" position, on landing,
the moment the plane touched the ground,
the little "feeler" that extends below the
fuselage "tripped" the landing gear so that
it dropped just in time to support the ship.

For how much longer would German
modelers be sending their photographs to
MAN? In the U.S., everyone enjoyed a
period of prosperity as orders from Eu-
rope for armaments and other war equip-
ment began to escalate, but Britain and
Germany had already introduced con-
scription, so young modelers were more
likely to be found learning to fly planes
than making them. Meanwhile, giving
everyone an innocent foretaste of what
was to come, Jaliot Curie demonstrated
the possibility of splitting the atom, and,
more ominously, in Germany, Hitler's
"Mein Kampf" was published.

And you'd *never* be able to play *base-
ball* in your basement!

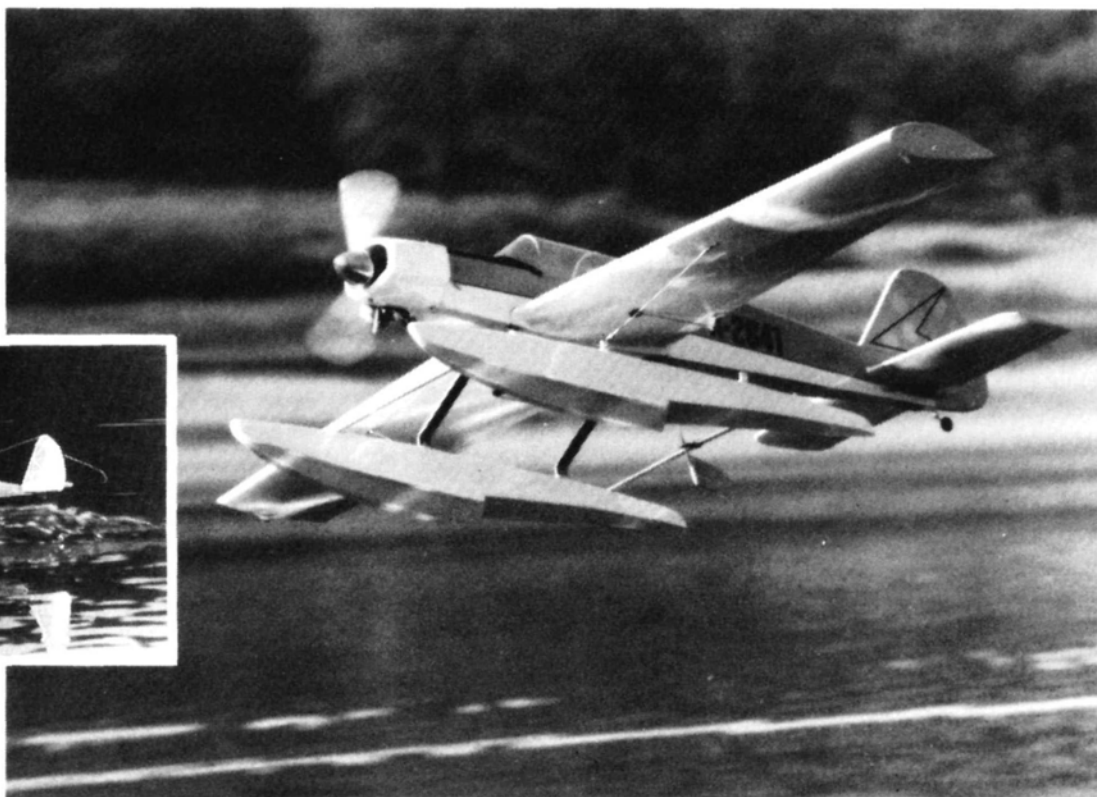
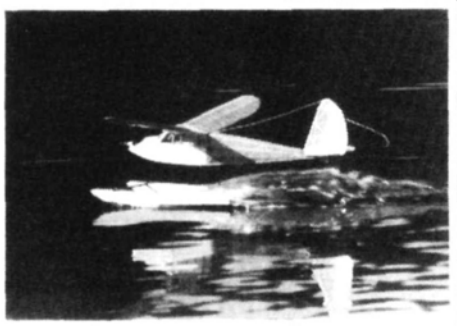
Floating Around

by JOHN SULLIVAN

OUT TO THE SEA IN SHIPS

Right: Gary Stanton's Dalotel blasts off the water. Note mid-ship rudder. See text for specs.

Below: Gordon Wheeler's Pacific Ace electric charges away. Little battery job is a snappy yet docile performer.



ONE OF THE benefits of being a float columnist is that I can write about full-scale retrieval boats. Unless you fly from a lake with good shoreline access, or one with a dependable wind direction, or you love to swim, you'll need some sort of a boat to retrieve your models. Over the past four years, our club has acquired two 10-foot aluminum John Boats. They were both beaten to death when we bought them at less than \$100 each, and they're both capable of leaking at the rate of one six-pack per hour!

The John Boats work well for a short trip out to a disabled plane and back. However, finding "boat people" to transport the boats to and from the lake was a problem up until a couple of years ago, but we now have six members who share this duty for a month at a time. At the lake, the pilot whose plane is down is usually the

one who retrieves; and if the retriever happens to be out when another plane dead-sticks, he'll bring back that plane also.



Stanton's Dalotel on flat-out speed run. White blur in the background is an egret fishing the shallows.

Apart from this, there's another aspect to this boat business—an added dimension. It's just a lot of fun to "muck around

in boats." Some of my best moments have occurred when I've stowed the oars and just drifted the last few feet to my downed plane. At times, when the water's calm, I almost hate to ruin the reflection by lifting the plane into the boat. So three months ago, since I've enjoyed every minute that I've ever spent in a boat, I decided it was time to have a boat of my own.

As usual, I picked the longest distance between two points, but I'm having an absolute blast! I bought the boat with a trailer and an old 10-horse Merc' for \$200 from an out-of-work carpenter. Some say he got the better deal! In its original form, the boat was a fiberglass 12-foot, two-bench open runabout. As I see it, it's going to be a 12-foot Cuddy Cabin Day Cruiser with wraparound cockpit seating, a new 25-horse Mercury, remote steering, cutout transom, a cooler, storage, running

(Continued on page 56)

FLOATING AROUND

The author with a new 25hp outboard he was forced to buy in order to continue his study of R/C floatplanes.



lights, etc. As one of my video customers (Ken Bassett of Onion River Boat Works, NH) put it: "You're going to jam all that in a 12-foot boat?!"

The crossover from building planes to building boats has been a natural and really rewarding experience. There's a whole new terminology here like ribbands, knees, thwarts, stems and the like; but when you get right down to it, they're all just different names for all the parts you put in a plane with floats. I've often thought that once you've mastered R/C modeling, you can work at perhaps a dozen different trades. This is proof! At the stage you see in the photo, the boat has been stripped, and a fresh skin of 10-ounce fiberglass cloth has been applied to the bottom. The interior sports a new floor with two-part polyurethane positive flotation and all the ribs to form a foundation for storage racks, seats, decking, etc. If everything goes as planned, we'll take this puppy out to a big lake and videotape floatplanes taking off, in flight and landing right next to the boat. The tentative title for this new video is "Son of Float Flying," and it should be ready for release in the fall. Watch for it.

80-Percent Rule

When I started this column three years ago, I was faced with the task of establishing rules to determine the length of floats for any given plane. At the time, 75 percent of the fuselage length was the rule of thumb. After surveying almost 100 models to determine weight, distance from prop hub to CG and from CG to rudder hinge line, I found that 80 percent was a more accommodating figure. We're trying to find a simple formula to encourage beginners to get into float flying, and I've been fortunate enough to talk to many of you through John Sullivan Model Floatplane Products*. We've sold over 1,000 pairs of floats during our first year, and experience has confirmed the 80-percent rule. The exceptions have almost

Right: Gordon Wheeler, Bob Wakerlee and Gary Stanton pose apprehensively for the author's camera. Northern California, January '89.



Above: Bob Wakerlee's Seamaster 40 skims the water at the Hennessey pontoons flying site. Picture gives the prospective float filmer something to "reflect" on.

Right: Sullivan's 12-foot runabout in the framing stages. See text for more info.



always required an even *larger* float, so I think we should amend the rule as follows: To select a pair of floats for your model, multiply 80 percent times the fuselage length (prop hub to rudder hinge line). If the resulting figure doesn't give you at least a 2-inch extension of the float bow in front of the prop disc with the float step positioned under the plane's CG, move up to the next largest available size. That's all there is to it. The 2-inch extension will ensure that your floatplane won't nose over at the beginning of a takeoff run.

Hostetler Float Plans

I've just received a plans update from Wendell Hostetler*. I'd noticed Wen-

dell's ads for a long time, but never realized the extent of his offerings. He has plans for some of the most beautiful planes that full-scale aviation ever produced, including three Cubs, a Fairchild PT-19, a Bücker Jungmeister, the Steen Skybolt, Wedell-Williams Gilmore Red Lion, the Art Chester Jeep, a Lockheed Sirius, the Turner Special and more! These are all big models with wingspans of 80 to 100 inches. They're incredible! The real news, though, is that Wendell is now offering a set of plans for a pair of 60-inch amphibious floats with details for jackscrew retracts. He already has plans for 54-inch floats, and with the 60-inch float addition, appears to have floats

(Continued on page 108)

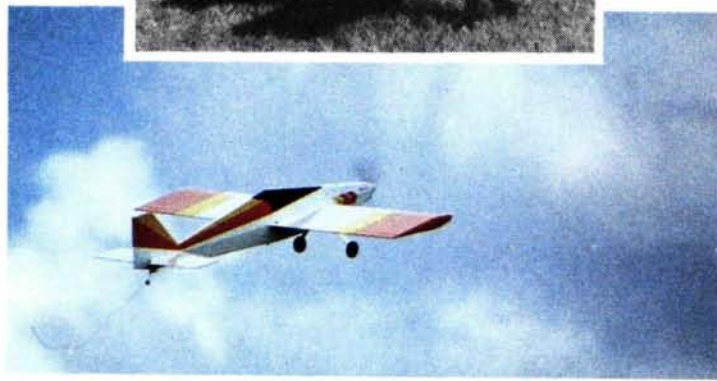


Left: Beautiful Super Playboy built by Dixie Cutrone. Spans a whopping 9 feet and is powered by an O.S. .90 4-stroke. Weighs 9 pounds.

Below: Eckhardt Calder and Emil Agosta pose with Eck's 32 pound, Zenoah-powered Jungmeister. Model is 1/3 scale with an 88-inch wingspan.



Right: Cloud Dancer show team member Don Mudiman with his fantastic Flying Machine. Unbelievable performance from this 6 1/4 pound, O.S.-powered model. A real crowd-pleaser.



Above: Tom Stryker's 'Lectric Hots was a great performer on an 05 electric motor. Very quiet design is a future MAN construction article.

Right: Exciting T.O.C.-type Ultimate biplane built and flown by AMA President, Don Lowe. Put on a crowd-pleasing demo during the air-show portion of the Fun-Fly.

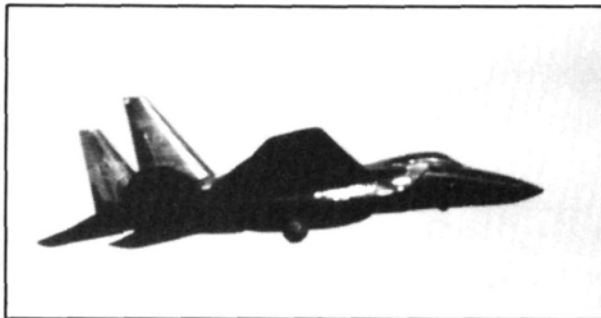


PHOTOS BY WALLY ZOBEL



Left: Contest Director Frank Vidmar with his large-scale Laser 200.

Below: Very pretty and fast Violett Sport Shark built and flown by Don Huffman. Ten pounds with KBV engine and Violett fan unit.



Tom Veloskey flew one of the two Byron F-15 Eagles used during the air-show portion of the fly-in.



Although really a "fun-fly," winners in various categories were awarded plaques for their accomplishments. Everyone sure looks happy!!

R/C WORLD

5TH ANNUAL

FALL FESTIVAL

FLY-IN

by WALLY ZOBER

Organization, planning and participation made this scale-dominated affair a huge success

ON NOVEMBER 24 through November 27, 1988, the R/C World Flyers held their 5th annual Fall Festival Fly-in and air show. This type of fly-in is becoming more and more popular throughout the R/C modeling world, because it's designed to please both pilots and spectators. You don't have the pressure of competing; but you do have the pleasure of good fellowship with other R/C modelers and, best of all, you have lots of flying.

With 79 pilots registered and 121 airplanes on the field, this fly-in

R/C WORLD

5TH ANNUAL

FALL FESTIVAL

FLY-IN

was a great success. Twelve of these planes weren't scale models, but were part of the air show, e.g., the Cloud Dancer's parachute-dropping airplane; Don Mudiman's Flying Machine; Bob Violet's Viper; Ed Izzo's Big "B"; Eckhard Calder and Ed Stone's two giant Sticks (finished to look like WW I Eindeckers); Jim Losie's banner-towing, 10-foot Telemaster; and Eric Dern flying his Candyman, an airplane that dropped candy with streamers for the kids to catch. Eric also had his giant-size flying Hot Dog piloted by Donald Duck and both planes were

showstoppers for the kids and their parents.

A fly-in and air show of this magnitude take a lot of planning and cooperation of

club members and this whole operation was directed by Frank Vidmar. To promote this fly-in, we did a lot of advertising with a heavy mailing of flyers sent to



Above: Ed Izzo and Dr. Walt Good with Dixie Cutrone's Super Playboy. Ed is wearing a pair of 1938 Nats medals won with indoor and outdoor stick models.

Left: Scratch-built F/A-18 Hornet from Dave Escobar, molds by Jerry Killen. O.S. 77/Dynamax fan provides power for this good-flying, 1/10-scale jet.



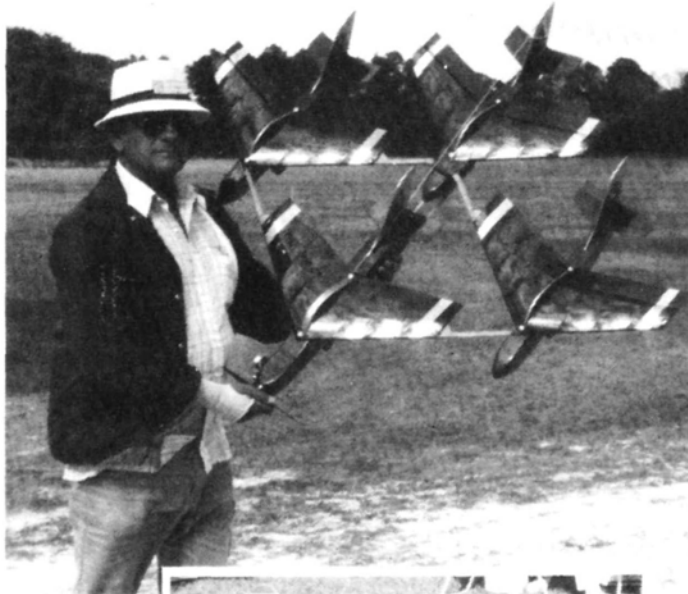
hobby shops and other clubs. We also put an announcement in our local newspaper and, best of all, we gave an R/C scale-model flight demonstration, live, on local TV. We featured Don Lowe, AMA president, with his 1/3-scale Ultimate biplane, and Less Fruh, flying his 1/3-scale Laser 200. With this type of promotion, we wound up with several thousand spectators.

Our air show Director, Norm Holland, choreographed a great show. Each day at noon, the field was closed to general flying, and a 1 1/2-hour air show, using scale, sport, and novelty R/C airplanes and helicopters was put on.

The show started with Lee Erminger flying his Blue-Bird formation jet-flying model airplane that's really one airplane. This airplane is actually four, small jet-type models tied together with arrow shafts, but in the air, you can't see the arrow shafts. The model actually looks like four jets flying in tight formation (an old Ken Willard design).

Ed Izzo, Don Lowe and Less Fruh followed with a super show. They all flew large-scale models in a display of aero-

Lee Erminger with his "formation flying" model: four small airplanes tied together by arrow shafts. It creates the impression of a formation while in flight.



Right: Alphonse Kistner's Yak-55 aerobatic model was built from an imported kit. The 7 1/2-foot-span model is Zenoah G-62-powered and impressive.



WORLD FALL FESTIVAL WINNERS

Best Military Scale

1st Place: Phil Corso (Byron F-15)
2nd Place: Jeff Ling (Hawker Hurricane)
3rd place: DeWitt Dalton (F-4U-1A)

Best Civilian

1st Place: Eckhardt Calder (Great Lakes Trainer)
2nd place: Burnis Fields (Spacewalker)
3rd place: George Jordan (Chipmunk)

Best Sport Category

1st Place: Daniel Lancaster (Eagle 63)
2nd place: Jerry Smith (4-120 biplane)
3rd place: Alphonse Kistner (Superstar).

Best Giant-Size

1st Place: James Boyd (P-51 Mustang)
2nd place: Alphonse Kistner (Yak-55)
3rd place: Cliff Bennett (Rainbow Hawk)

Best 4-Cycle

1st Place: Harry Lockwood (Bird Dog)
2nd place: David Escobar (Extra 230)
3rd place: Gary Ballard (EAA-Bipe)

Best Ducted Fan

1st Place: Jerry Keller (F-18)
2nd place: David Escobar (Viper)
3rd place: Don Huffman (Sportshark)

batics that was accented by crowd-pleasing smoke systems.

The Cloud Dancers International Show Team has to be one of the best around. Their well-planned and executed routine begins with R/C robot parachute jumpers. A specially designed twin-engine R/C airplane gets the robot parachute jumpers aloft and when the desired altitude is reached, they're released and guided back to earth by R/C pilots on the ground—a great act!

After this, the show team switches to the Byron Bullets. These Byron jets are extremely fast and aerobatic, with all maneuvers done safely at low altitude, yet they're close enough to thrill spectators.

Following this, Don Muddiman and Tom Velosky Jr. switched to Byron F-15s for their great formation-flight routine. These large jet models are flown with absolute precision. For their finale, they

(Continued on page 114)



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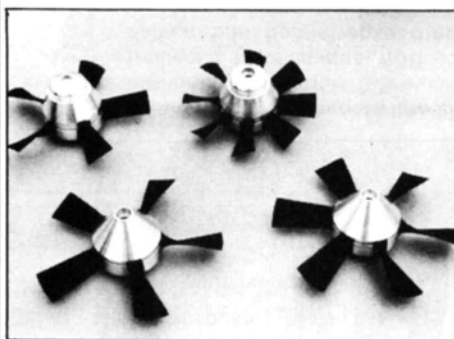
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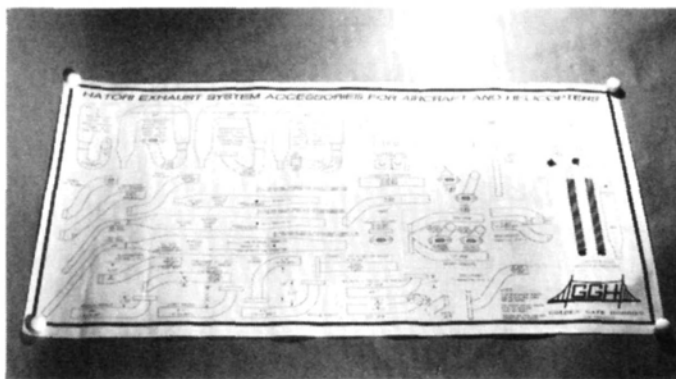
Pattern Matters

by MIKE LEE

I'LL START THIS month with news of some product releases that will help make pattern and sport life easier.

First, there's a building aid from Golden Gate Hobbies*. This is a blueprint of the entire line of Hatori products, including headers, pipes, mounts, and associated equipment. It's useful in the layout when building a pattern bird, and it allows the accurate measurement of the items for fit to the airframe. Pretty neat idea!

If you're like me, you probably run engine fuels that drool all over the engine every once in a while, causing the oils to bake onto the engine casing and make it look awful. If you're really lazy, you just let it build up until the engine looks as though it was anodized that way, and no one will ever know the difference. But most of us are proud to display our planes and their engines, so we prefer a clean engine. Besides, a clean engine also dissipates heat far faster than one that's gunked up. Chevron Hobby Products*, the makers of the famous Perfect Paint



From Golden Gate Hobbies, a blueprint plan of the entire Hatori product line for fitting up equipment to your aircraft. All drawings are exact size and shape, and the plan tells which engine and aircraft the item will fit. Costs less than \$10.

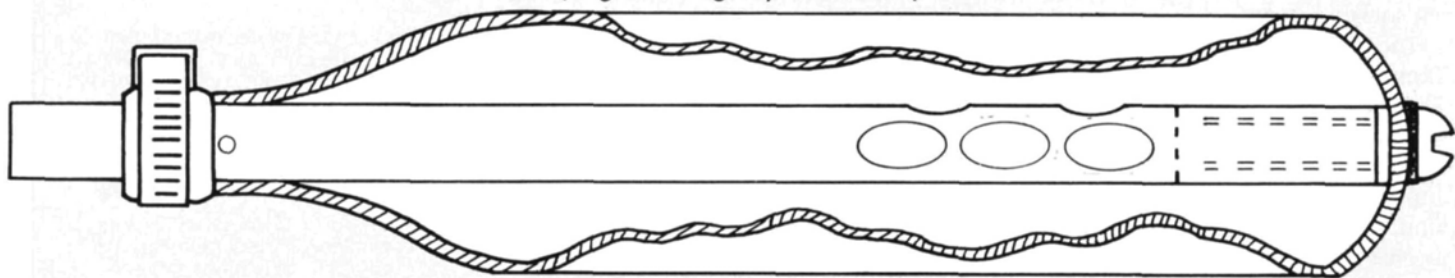
Stuff Instant Adhesives, comes Hot Stuff UFO. The UFO stands for "User Friendly, Odorless," and it's expressly designed to provide exactly the same handling and adhesive characteristics as the regular Hot Stuff adhesives, but *without* the acrid curing odor. Bob and Bill Hunter of Satellite City recently sent me samples of the product: one each of the regular thin adhesives and the thicker, gap-filling adhesive.

Having used this type of adhesive for

about that!

Since I was right in the middle of building my latest bird, the Excelsior, I trusted the word of Bob Hunter and used UFO to glue the stab halves together. The stab is a standard foam core with balsa sheeting, and had to be permanently joined in the middle. I gritted my teeth and *poured* the thicker, gap-filling UFO all over one stab half, and then I immediately stuck on the other half. Ten seconds later, there was no sign of foam being eaten away, so I hit

First Weedwacker Muffler Modification (original design by Fred Miller)



This drawing by the First Weed Whackers Club shows the muffler modification described in the text. Simply adding a length of arrow shaft results in a drastic cut in exhaust noise emission.

line of paints, has introduced a product called Perfect Engine Cleaner. It needs no equipment to make it work—just a container for the solution in which you soak the engine parts. Chevron claims it's harmless to plastic parts, gaskets, bearings, and even your hands, and that a 30-minute soaking should get all that unwanted gunk off your engine. This sounds a lot easier than wire brushing!

From Satellite City*, the makers of Hot

the last 12 years, I've almost grown accustomed to having my nose wiped out by the smoke and vapor produced when CA hot-sets. The new UFO adhesive produces little, if *any*, detectable fumes, even when hit with the hot accelerator. Not bad! Cure times are approximately the same as those of the standard Hot Stuff. However, the UFO adhesive goes one big step further: It's compatible with foam—almost *any* type of foam! Oh yeah? Let's just see

the stab with hot accelerator. No problem! The foam was totally intact and the joint secure. Not only was that fast and clean, but I was also relieved that I hadn't wasted a perfectly good stab. The UFO works as advertised; try it for yourself.

Super Split-S

The technical note this time has to do with the turn-around maneuver used in standard AMA pattern. Pilots entering pattern

often wonder why the standard thing to do is a pronounced split-S maneuver to turn the ship back toward the show center. Believe me, it isn't because Bob Hoover does it all the time with his big P-51 Mustang at the air shows; but that *does* have something to do with it.

When flying pattern maneuvers, the rule book specifies that the ship should be flown at a certain distance from the judges: about 300 feet (although, for all practical purposes, it's usually further). Whatever the distance might be at any particular meet, it's a distance that provides pilots and judges the optimum view of the plane as it maneuvers. If too close, the ship appears to go over your head (and usually does). If too far away, the judges will believe that you're out there to hide a defect in the maneuver. So the correct distance must be maintained to provide a consistent view and distance in which to maneuver.

The split-S turn is the easiest maneuver you can use to maintain the correct distance. Simply executed, the plane rolls 180 degrees to inverted and then loops through 180 degrees to straight-and-level flight on a heading in the opposite direction from that of the entry. However, in our case, doing such a maneuver from our normal altitude would usually be quite disastrous.

Our pattern birds are usually only 75 to 125 feet off the deck when we hit show center for a maneuver. Obviously, we're too low for the split-S, so a pronounced, or exaggerated, split-S is done to compensate. In this move, we simply pull the nose up to about 45 degrees or so, roll over 180, and then pull through the loop until we arrive back at straight-and-level flight heading back toward show center. But there's more to it than that.

The split-S should compensate for mild heading changes. A cross-wind can blow the ship in or out of the line of flight; but a slight amount of rudder on the way up and into the split-S will correct the distance. Try not to use aileron too much for this, as it will usually over-compensate.



Soaking your engine casings in Chevron Hobby Products' newest item—Perfect Engine Cleaner—will dissolve engine gunk and castor residue. See your hobby dealer, or write to Chevron.

Changes in altitude are also corrected in this maneuver. Simply allowing the ship to drop lower, or pulling up earlier, will correct the altitude. This is the "golden-opportunity" maneuver in pattern flying, and you should use it constantly.

It doesn't quite stop here, either: I also use the maneuver to make any required trim changes. Changes in fuel head, or an accidental bump of the trim will take the "hands-off" trim away. Here's where you can correct that problem, without worrying about whether the judges are watching. I also use the maneuver to correct my distance to show-center timing. Everyone has a certain rhythm he must achieve before doing a maneuver. If you're rushed, the execution of a task or maneuver is hurried and out of timing. When there's plenty of time, the pace is more relaxed and the execution easier. That's timing. I'll fly the bird out farther or in closer, using the available airspace to adjust my timing. There's no limit to the time you can take between maneuvers, so take all the time you need for the split-S; this will get you set up right.

Last, use the time out there wisely: Get the altitude and distance set up; get your timing correct. But don't forget to keep an eye on the aircraft as well. Many pilots will roll that baby over and whip it down through the split-S as though they're trying to stress the wings. You can hear the engine rev out—the familiar piped scream of 18,000 rpms coming alive. Now think of the stress to which the 130mph

pull-out is subjecting the center section of your wing. Sure, most of us pull up hard to execute a square corner at full tilt, and we don't think twice about it. But why stress the wing when you don't have to? Treat the airframe with respect, and it will last longer.

Now you know why the split-S is the preferred turning maneuver for flying pattern in AMA. There are other maneuvers, and the most readily thought of is the procedure turn. This maneuver is both time-consuming and, at best, difficult to use for heading compensation. Certainly, a stall turn can be used, but it's potentially messy in windy conditions. No matter what your choice, the split-S is by far the easiest and simplest maneuver to use for maintaining the correct distance, height and timing in turning around.

Muffler Mod

I received an interesting newsletter from the First Weedwackers Aero Squadron club, of La Mesa, CA. Editor Don Westergren featured an article that showed a muffler modification designed by Fred Miller. The design takes a standard O.S. Max muffler (this one from the Max 40 FSR), and Fred inserts a 5/16-inch-i.d. aluminum arrow shaft into the muffler, from the stinger section to the very front. The shaft is drilled through with 1/4-inch holes, and it's held in place at the front with an 8-32 bolt and thread-locking compound. At the rear, the shaft is held in with a piece of vacuum hose and a hose clamp or a slip-tie for a friction-fit. The idea (which worked) was to add a baffle to the otherwise un baffled muffler, thus breaking up the sound waves and lowering the noise level.

Testing done by club members and its designer indicated that the noise drop experienced was about 3dB below normal, and the engine lost about 500rpm. Now, 3dB doesn't *sound* like much, but you must consider that for every couple of dB, the noise level is double. The loss of 500rpm on a 40-size engine isn't a lot,

(Continued on page 119)



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SPORT BIPLANE

(Continued from page 21)

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Master Airscrew; distributed by Windsor Propeller Co., 384 Tesconi Ct., Santa Rosa, CA 95401.

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COX ENGINES

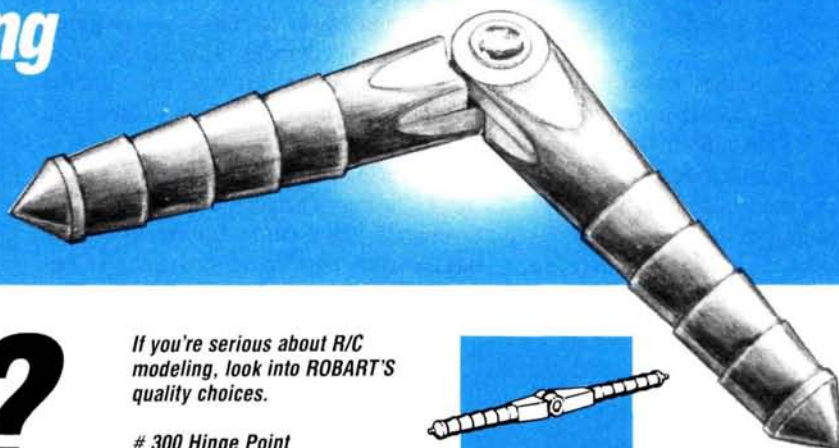
(Continued from page 39)

through this ink mark and the center of the plug should run as straight as possible across the engine.

Accurately measure the total travel of the servo you'll be using to operate the Dragonfly's throttle, from one extreme position to the other, at the hole in which you'll be installing your pushrod. Now make a mark on the Dragonfly's muffler/

(Continued on page 71)

Still chiseling slots for hinges?



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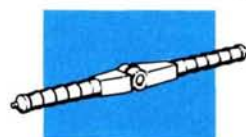
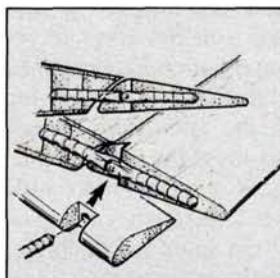
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by RICH URAVITCH

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ELECTRIC CHIPMUNK

PHOTOS BY RICH URAVITCH



FOR A NUMBER of very valid reasons, interest in electric-powered R/C flight is growing rapidly in virtually all areas of the country. Noise, and the resultant loss of flying sites are among those problems most frequently cited with regard to gas-powered planes. While much remains to be accomplished on the gas-powered front, to both better silence our methanol-drinking powerplants, and to make the public more aware of what we're doing to reduce the annoyance factor, electric power is being chosen by many as an available al-

ternative propulsion source for our R/C airplanes. It's "quietly" gaining in popularity as development, just as quietly, progresses. The current electric R/C kits consist primarily of high-wing, box-type trainer designs that follow

ELECTRIC POWER IS BEING CHOSEN BY MANY AS AN AVAILABLE ALTERNATIVE PROPULSION SOURCE FOR OUR R/C AIRPLANES.

pretty much conventional design parameters and can provide many enjoyable, "cruising around" hours of quiet flight. Lightweight construction, along with powerful motors and well-designed props, allows these new-generation, battery-fueled models to do nearly everything their gas-powered brethren can: ROG, mild aerobatics, and relaxing flying are all within its capabilities.

In many cases, the modeler outgrows the lazy, tranquil performance of the trainer-type model and starts looking for more aerobatic performance, higher power and greater challenges. Responding to these requirements isn't an easy task,

because all the current electrics employ the 6- and 7-cell, 7.2 to 8.4V battery packs, which have become commonplace in the world of R/C car racing. These packs, while ideally suited to cars, become a key element in the design

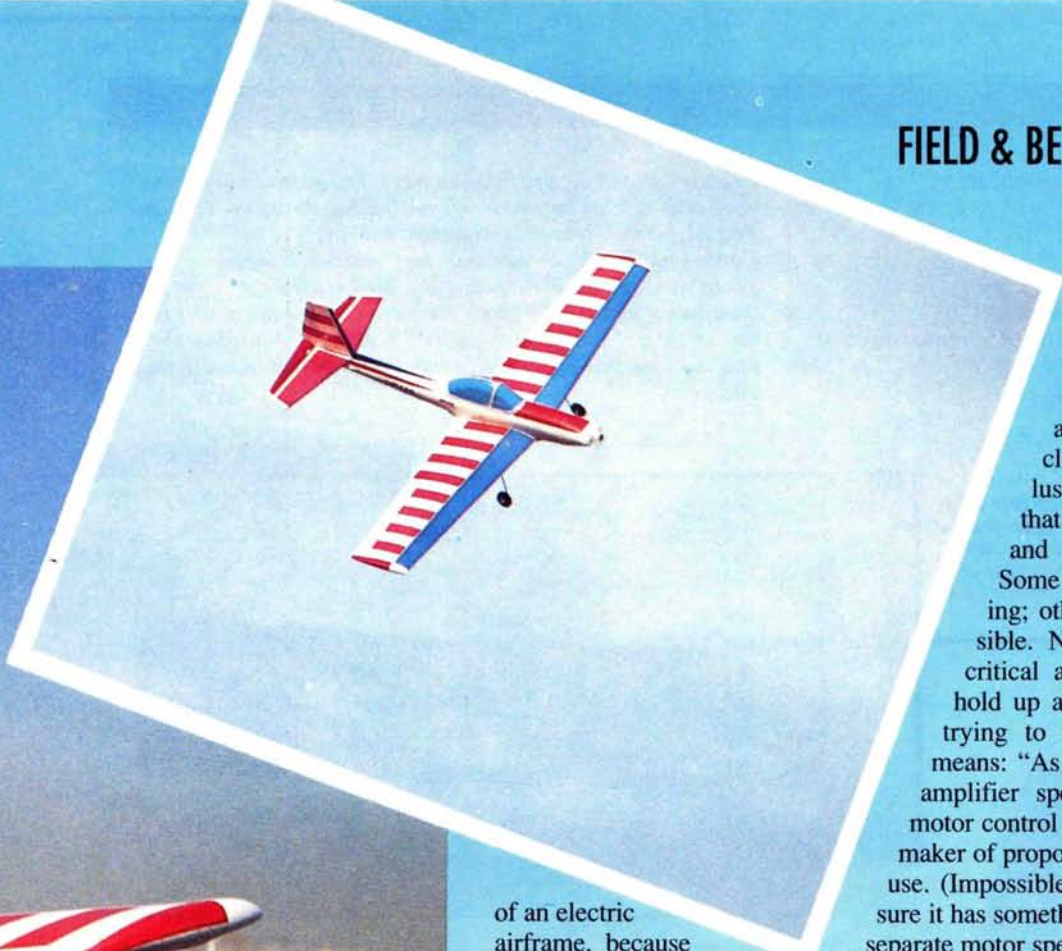
FIELD & BENCH REVIEW

ASSEMBLY:


Construction, or, more accurately, assembly, is clearly defined in an illustrated 15-page manual that includes both English and Japanese instructions. Some of these are entertaining; others are incomprehensible. None of these was in critical areas, and they won't hold up assembly, but I'm still trying to figure out what this means: "As this kit airplane is of amplifier specification, prepare a motor control amplifier made by the maker of proportional transmitter you use. (Impossible with the back.)" I'm sure it has something to do with using a separate motor speed controller, like that used in R/C cars, and the illustrations *do* seem to point that out. I avoided the problem by using the new Futaba MCR-4A receiver that has a built-in motor speed control, plus three other channels: one each for rudder, elevator and aileron.

This variable speed control is another thing that really contributes to the performance of electrics. For the first time, we have a fully variable throttle capability, just like with the glow-powered birds. Just imagine idling, taxiing, applying power for takeoff, coming off the power for maneuvers like the stall turn, and actually flying a landing pattern where you can reduce or apply power as necessary. It's great, and a really unique experience.

The wing panels are joined using laminated lite-ply joiners and ply center section ribs (my kit contained an extra set of ribs). The epoxy for this step is included in the kit. Adding the vacuum-formed plastic wing tips is next. They require careful trimming because of the thinness of the material, so take your time. The fit to the wing panel isn't that good, but with a little coaxing, it becomes acceptable. The foam tail components are attached to the fuselage with epoxy and accurately aligned by the supplied, foam, 90-degree jigs. These are very handy and should be kept around your shop for use on other models you might build.



of an electric airframe, because its weight must be hauled aloft with the airplane. That's not a great problem when you have a thick, flat-bottom airfoiled wing with generous area to do the job. But getting performance usually involves thinning the wing section to reduce drag, using at least a semi-symmetrical section and reducing the area. This is all in addition to putting



the total airframe on a diet with an overall weight-reduction program. Hirobo has answered the challenge by introducing the Electric Chipmunk that's being marketed by Futaba*—you have heard of them, haven't you?

The first departure of the Electric Chipmunk kit is that it's an ARF, which means Hirobo has done virtually all the work for you. As a result, most of what's in the box isn't something that you'd find easy to produce in your workshop. For example, the fuselage, cowling and canopy are vacuum-formed plastic units that require very little work. The wings are supplied in halves, are pre-colored and require only joining to be ready to attach to the fuselage. They consist of plastic-laminated thin sheet foam bonded to a balsa rib and spar structure. Hardpoints are incorporated to accept the music-wire landing-gear struts. The tail group is solid sheet foam, which, although appearing delicate, seems to be holding up well.

The propulsion unit is pre-assembled, and it transmits power from the electric motor to the prop by means of gear reduction. The gear mesh in the drive unit is adjustable, and it comes in quite handy during maintenance and repairs. A really nice feature of the design is the incorporation of a replaceable shaft. This component is vulnerable during some of the less-than-perfect landings. On some other designs, damage might require parts replacement that, in some cases, might include the motor itself.

SPECIFICATIONS

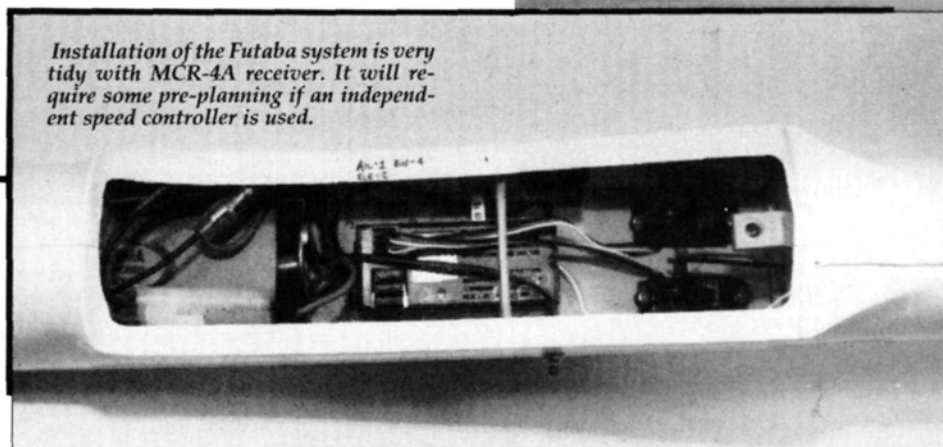
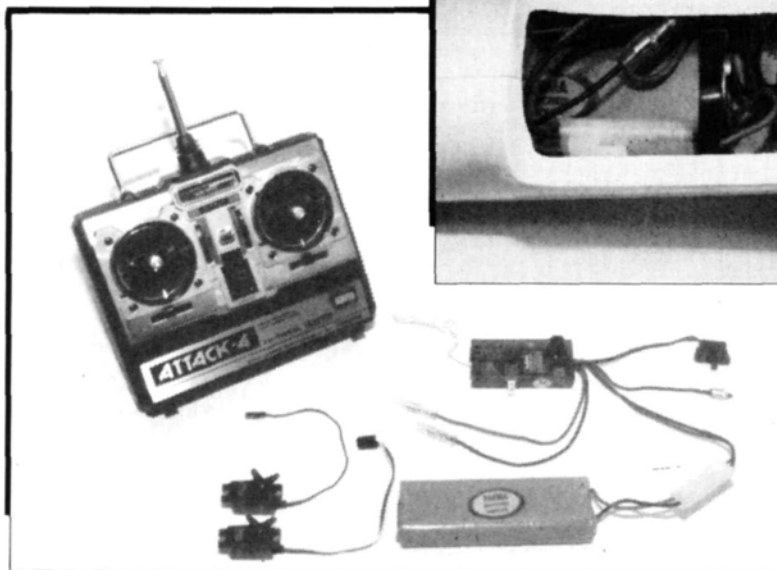
Type: Scale-like ARF Electric, aerobatic
Span: 47 1/4 inches
Length: 35 7/16 inches
Weight: 2 pounds 10 ounces
Wing Area: 360 square inches
Wing Loading: 16.8 ounces/square foot
Power Required: Geared Top Gun 90 electric (supplied)
Battery Required: 7.2-8.4V/1200 mAh NiCd
Number of Channels Required: 3-4
Suggested Retail Price: \$239.95

Features: Pre-decorated flying surfaces. Tail group is sheet foam, wing is sheet foam over conventional built-up structure. Vacuum formed plastic fuselage, cowl and canopy.

Comments: To obtain maximum performance, a mini or micro system is required. The cowling is pulled much too thin for the installation and the landing gear mount arrangement will not absorb the occasional "non-perfect" landing. The airplane flies fairly well but propeller experimentation might improve performance.

Below: The electronics end of this project: Futaba Attack 4E system features the 4-channel MCR-4A receiver and a pair of mini S133 servos. Receiver provides speed control function also, so flying isn't just full-on or -off power.

Installation of the Futaba system is very tidy with MCR-4A receiver. It will require some pre-planning if an independent speed controller is used.



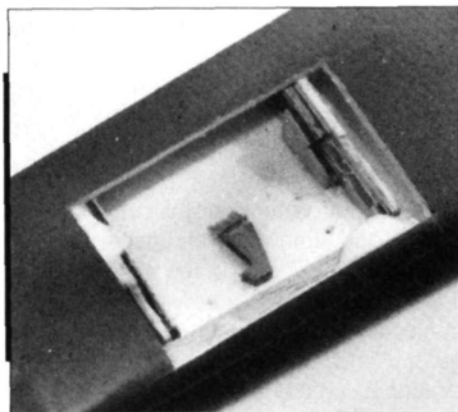
Aileron linkage and servo installation are clearly explained and should present no problem. The tail-wheel wire will require some modification if you want to prevent it from casting. Remember though, you do have a throttle capability

that will be great for taxiing, but there's no linkage interconnection between the rudder and the tail wheel. If you decide to make the tail wheel fixed, you can put a piece of lite-ply externally between the fuselage and the strut to lock it in a straight position.

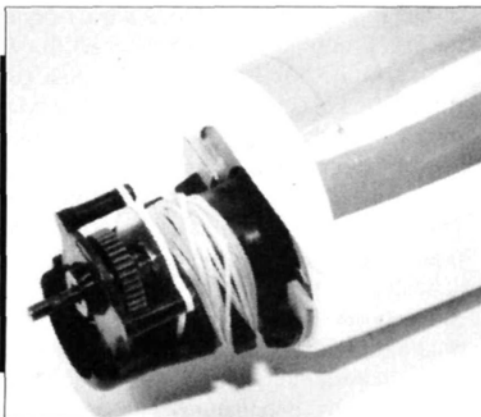
The radio installation is no problem, and since Hirobo recommends using servos that weigh less than 20 grams each, the decision to use Futaba minis (S-133s) was easy. I used all four channels, but since the motor speed controller was incorporated into the receiver, the installation required only three discrete servos. The pushrod tubes for the rudder and elevator are already installed and align properly with the die-cut servo tray to which the servos are attached. The receiver mounts on foam tape just aft of the propulsion battery. Since this battery also provides power for the receiver and servos, no separate Ni-Cd pack is required. Good thing, too, because space is starting

to get a bit tight. If you use a separate speed controller, spend a little time planning its location.

A few things presented some concerns early on, and I should mention them here. In the interest of the weight saving that I talked about earlier, it appears obvious that Hirobo was intent on doing everything possible to shave grams, if not ounces, from the airframe of the Chipmunk. They did! They overshot a bit when it came to the cowl and landing-gear installation. The cowling in my kit was thin—very thin. It arrived distorted and wrinkled, requiring careful application of



Landing-gear mount won't withstand repeated "non-greased" landings, even on prepared surfaces. Rough grass fields will make things worse. If your Chipmunk gets to this point, beef up the trunnion area that receives the vertical portion of the gear strut.



Geared 540-type motor is rubber-banded into its gearbox/mount assembly. Like most airborne electrics, the prop shaft is vulnerable on nose-over landings, but this one can be easily replaced.

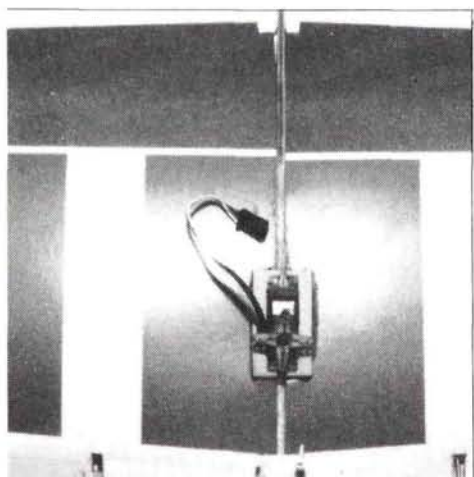


Don "Armstrong" Conrads shows perfect Olympic form while "javelining" the Chipmunk on its first flight. Nick Zirola Jr. observes proceedings while manning the sticks.


heat to restore it to at least photographable condition. Owing to the thin section of the wing, the gear installation seemed delicate to begin with. It would probably have been adequate for a lighter airframe, but the weight of that battery pack concerned me. I wasn't wrong.

To simulate the appearance of canopy glass, Hirobo provides an extremely thin, transparent blue, vacuum-formed plastic that's carefully attached to the white fuselage with double-sided thin film adhesive tape. To create the "framework," vinyl decal material is then added. Seems like a quick paint application would have been much easier. Any paint would probably do, since there's no requirement for fuelproofing. After checking the CG, which almost *has* to come out right, I put the battery pack on overnight charge and

(Continued on page 122)



S-133 servo used for aileron is small, but has more than adequate power for this purpose.



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COX ENGINES

(Continued from page 64)

throttle, slightly less than *half* this measurement (with dividers or something similar) aft of the original ink mark.

Drill a small hole through the top side of the muffler/throttle at the second mark. (This is where your actuator wire will connect.) Use a Z-bend in the wire; there isn't room for anything like a ball end or a setscrew connector. All this sounds like a lot of work, but I can do it myself (hav-

ing had lots of practice!) in about 15 minutes.

To achieve the best performance from your Cox Dragonfly in a 1/2A R/C model first, use high-nitro fuel such as Cox's Racing Fuel with a 25-percent minimum nitromethane content and at least 25-percent castor oil-lubricant. Second, fly with a Graupner* 7-3 propeller. This seems to be the ideal prop for .049- to .061-powered sport-type R/C airplanes. Even though they're excellent, these props have one drawback: Their center hole is too big

for 1/2A engine use. You can get around this by wrapping a strip of masking tape around your prop screw until it fits the Graupner's hub. (This obviously won't always keep the prop running true.) A neater solution is to use a machined-aluminum insert to adapt the Graupner prop to your Dragonfly (or other 1/2A shaft). A high school metal-working shop will usually be glad to make you a few of these, either free, or very inexpensively.

In operating the Dragonfly, the idle is

(Continued on page 76)

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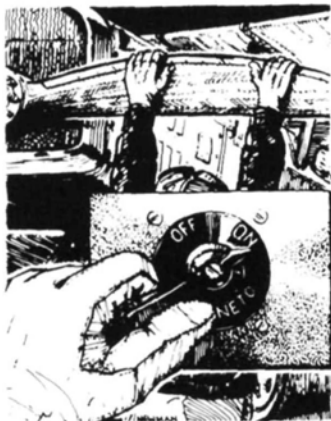
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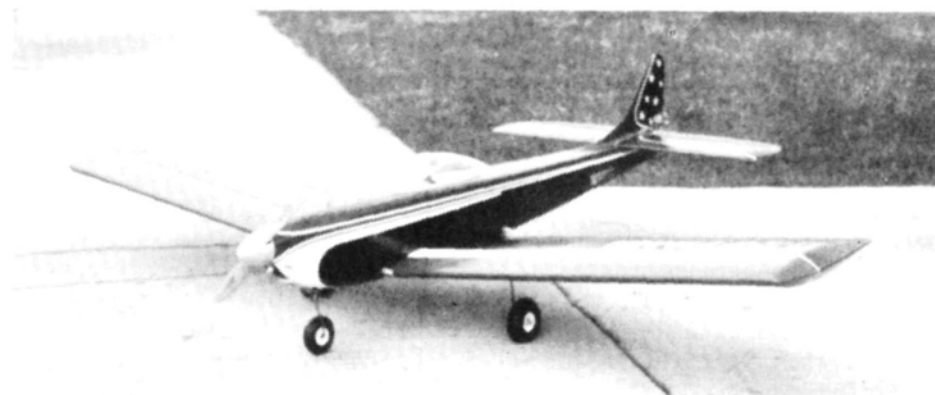


Golden Age of

by HAL "PAPPY" deBOLT

THIS SEEMS TO be the month to catch up with some of the interesting input to your OT R/C place. Let's start with the words of a Canadian, Gord Schindler, of West Hill, Ontario, who's still an active R/Cer and wrote to share some of his early experiences. In recent times, we've heard of R/C planes designed to fit into a suitcase so that you can take them with you when traveling! Just to show that nothing is new, Gord mentions a 1957 magazine article that led him to make such a plane. Since he was in the air force, it suited him well. In fact, it was his *first* R/C plane and, amazingly (for those days), it flew for a considerable time. Of sheet-balsa construction, the wing was just $\frac{3}{32}$ -inch sheet formed over a few ribs—so simple, but effective!

The radio was also homemade, following a *MAN* article by Ed Lorenz, who did so much for early R/C! The receiver used a "soft tube," which would use encapsulated gas for operation, e.g., RK-61, XFG-1, etc. (Today's "hard tube" uses filaments.) Gord remembers that most attempts wound up free-flight, but what a



Live Wire "Viscount" was popular early '60s kit. Modifications added variety, as with this inverted-engine version.

thrill it was when the radio *did* work! Onlookers thought Gord was a genius; little did they know how many bench hours it took to get that seemingly effortless flight.

Gord still remembers his Live Wire Super Cub, Ambroid Charger and Navigator with an O.S. single channel and electric servos (multi-servos?). He later had a multi analog system, which he says was a pretty red and had the devil within! Servos were so slow that the plane would

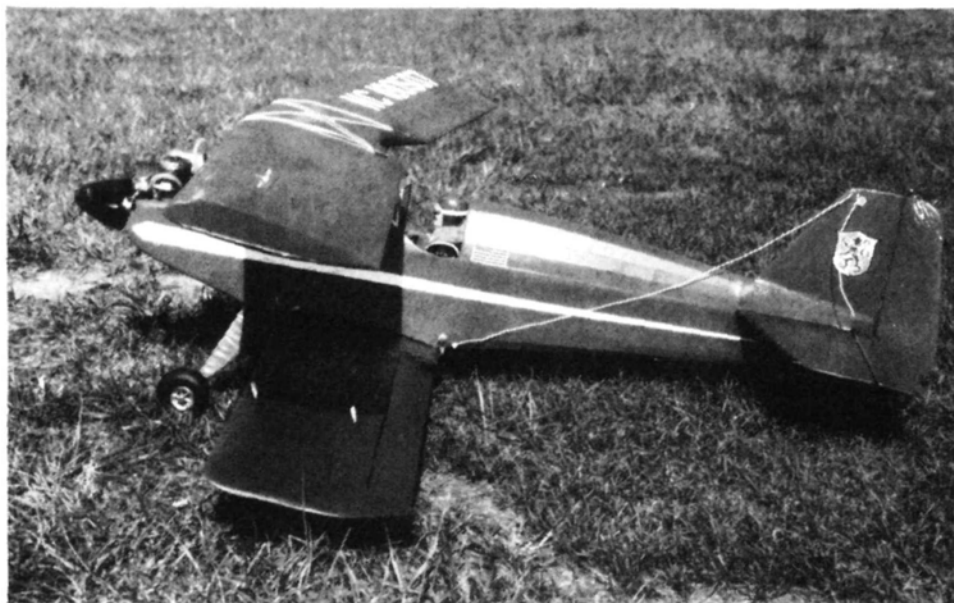
crash while you were waiting for the engine to slow down! "Best forgotten!" says Gord.

Gord enjoys OT R/C and is now flying a Sterling Tri-Pacer. He'd love to have a Goldberg Skylane 62, and would be grateful for information on a kit or plans. Like so many others, he thinks that many of the early designs would do really well with modern radios.

Also from Canada, Frank Rehak of Scarborough, Ontario, tells us that he had great luck with John Pond's plan service. He managed to get the much-desired Taurus, L.W. Super Cub and Veco White Cloud plans, and will build and fly them all. Frank needs a K&B green head .19 and the original Veco .19 for use with his imminent OTers. Can anyone help?

Frank has also been enthusiastically flying several modern pattern designs, but one day, he switched to an Andrews Sportmaster using a Saito .80. Its simplicity and performance are good enough to make him forget the complicated, expensive, modern stuff. From now on, he'll concentrate on OT R/C.

Most of the letters I receive are very lengthy with most interesting tales of early R/C. However, as one writer said, we all seem to have had the same trials and tribulations during the early days, so I'll only pass on news of the most unusual and curious.



Sixty-five-year-old Ernest Harbin's trainer! Built from Aeromaster plans, this has been more successful for him than common basic trainers.

Richard Hodge* was into early R/C, starting with a Dmeco C/L biplane and drone diesel. While he still subscribes to *MAN*, he has had to give up modeling, and he has a considerable stock of pre-'70s equipment for sale. Dick noted your interest in the Andrews Aeromaster biplane, and says he has an original kit with a Fox .60 and a Kraft Gold Medal KP-5B to suit it. He has many more early engines, kits and material, so those looking for OT R/C things might do well to contact him.

Don May of Slidell, LA, checked in with more unusual doings. Don tells of buying a Midwest Tri-Squire kit in 1974 for \$12.50, but he left it on the shelf. Last Christmas, his son built it, his wife bought a Futaba for it, and they gave it to him for Christmas. Talk about the Christmas spirit! He says it flies just great! As well as this, an old friend started a Berkeley Rudder Bug 20 years ago and recently gave it to Don with a Controilaire reed system for use with it. The Bug will be flying soon—with the Controilaire if he can find the instructions for it!

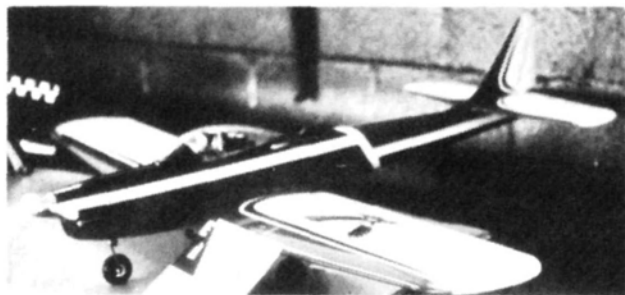
Here's a quick one from John Stare of New Castle, DE. John is another of our

his Interceptor is still in fine shape.

Let's go overseas to Geof Goldsmith of Surrey, England, who writes to compliment me on this column. Geof says that he flew an Astro Hog in pattern with reeds in the early days and, several years ago, he acquired an Astro kit and an O.S. 60 4S. He says this is even better than his original, and the quieter 4-cycle does not add to the noise level, which is seen as a problem in England. As a member of the English OT R/C organization, he has demonstrated the Astro Hog each year at the gala Old Warden meeting. The Astro always draws attention—especially his 4-cycle adaptation.

Geof has a need that has also been voiced by others. His original Orbit reed system needs servicing, and no one in England can do it. Does anyone know of a service center capable of repairing these reed systems? If you know, it would help us get antique equipment airborne, and then newcomers could see what it was all about.

Geof says his R/C experience led him to become an electrical engineer, so it shaped his life. So many times, a young-



John Stare's '60s Interceptor with retract gears, built from MAN plans. Note Kazmirski-style paint scheme on this de-Bolt design.

"retreads," and back into R/C more enthusiastically than ever. He says that following a fine *MAN* article, he built an Interceptor in the early '60s. At that time, John says his friends were astounded with the retract gears. The Interceptor was my finest pattern design and John says that, like me, he had "beauty marks" on the bottom of it after a small stone jammed the gears. Best of all, the pics show that

ster finds something in R/C that points the way to the future! How about Rutan, McCready and John Glenn? We could do a lot worse!

When I mentioned the Aeromaster biplane, I sure revived a lot of old memories and some not-so-old. Ernest Harbin of Flushing, MI, is an OT modeler first learning to fly R/C at age 65! He started with a Sterling Fledgling and managed to

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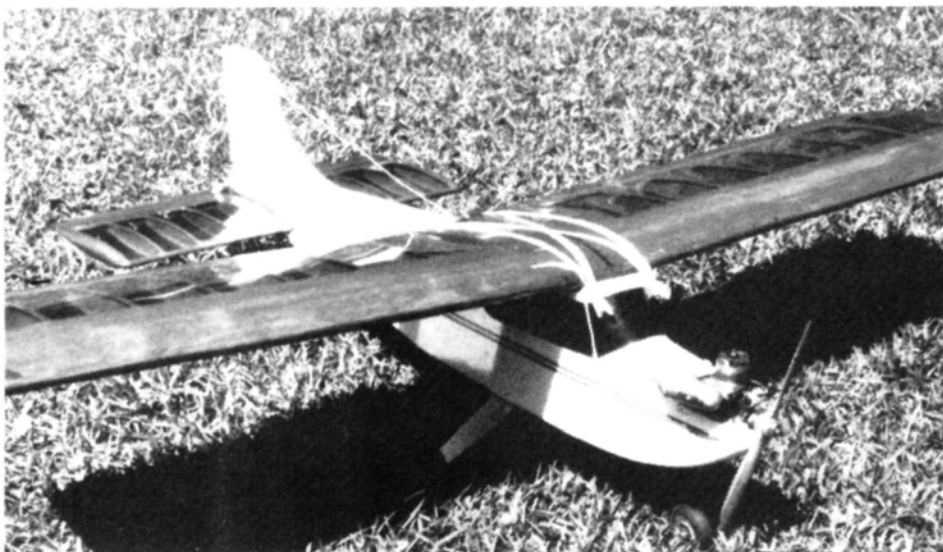
GOLDEN AGE

fold the wing airborne (you can imagine the result!). Next came a Goldberg Senior Falcon, which was lost after only six flights. These were both logical trainers, but can you believe an Aeromaster as a trainer? Ernie built one from original plans and is flying up a storm with it. It's powered by an Enya .60 and, using a Futaba PCM, he has progressed to take-offs and landings and is enjoying it immensely. Chalk up another win for that bipe of all bipes!

Lynn Fondots of Boyertown, PA, checked in with thoughts about flying vintage models. He has had fuel-draw problems with his K&B Sportster-powered Orion, and this has limited its flying.

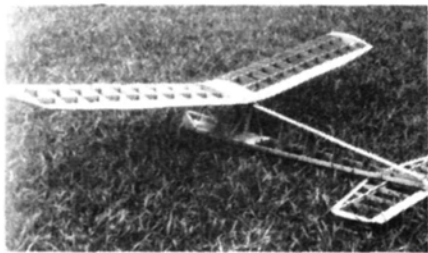
way to be sure your K&B operates as you'd expect it to.

Lynn discusses several vintage designs, and he echoes your thoughts that many of them would be excellent today. He emphasizes the Live Wire Viscount, which was a very popular design, as the kit was modern and so versatile. A .40 engine was ample power, and it did well with anything from reeds to Space Control. A modern system would reduce the weight by at least 1/2 pound. (The Viscount would love that, especially with modern power.) Lynn points out that there were versions other than the kit style: One retained the upright engine with block balsa fairing the nose neatly into a spinner, and a more



Santa doesn't forget R/Cers! Midwest Tri-Squire and K.D. May's wife and son collaborated in building the '74 kit for his Christmas present.

The original Orion had a low-mounted fuel tank that even gave Kazmirski anxious moments! Lynn was smart enough to call K&B with the problem, and they said that the Sportster should easily handle the low tank. They also told him to return the engine for inspection and/or



Sticks and more sticks compose this 20-year-old Berkeley Rudder Bug. K.D. May is finishing it; hopes to use Controlaire reeds in it.

replacement. Lynn's only hope was that something would be found wrong in the engine! Such service is typical of K&B over the years; they always go out of their

sophisticated version featured an inverted engine with a keyhole cowl fairing into a spinner. With retract gears, the nose-gear trough enhanced the cooling air exit on this sleek version. Lynn reminds us that there was a twin-engine modification presented in *MAN*, and it proved to be most successful.

Lynn's point is that this is only *one* example of an early '60s design that was "modern" in nature. By using them today, we can show others just how much good there is in the OT R/C movement.

I must mention a request from Bill Mitch*. How many remember the late Tony Grish and his Tornado propellers? Tony was an avid modeler, and Bill says he was enticed into early R/C by watching Tony neatly fly his L.W. Trainer. Bill soon had his own trainer using an Mac II TX and a Citizen-Ship receiver, and he says he had 99.9-percent success. He was also successful with an L.W. Cruiser, and he plans another with which to enter the

OT R/C movement.

Maybe someone can meet Bill's needs. He has a Bonner Digimite 4 in working order, and he'd like to use it. He has everything but servos, so does anyone have Digimite servos or, better yet, does anyone know how to adapt modern servos to the Bonner? If so, it sure would help Bill with his OT R/C.

Here's another offer that might help you. Harvey Sanders* has plans he'd be willing to copy, and some even include the design articles. How do these strike your fancy?: original Astro Hog, Flat Top Stormer and Voltswagon I and II. The Volts I used a thin 9-percent airfoil; the II was thicker at 12 percent (I think Dunham used the first version). Harvey has the original Taurus plans, which he obtained from Al Pinson in 1962; Kazmirski test-flew the plane on Thanksgiving Day, 1961.

Harvey also reminds us of other popular vintage designs that should do well today. How about Jerry Nelson's Rivets, Sultan and Jetfire? I'd like to hear from old friend Jerry, if he's reading this. Then there was Dick Rigg's Sorcerer and George Harris' Spitfire. The list of likely candidates for OT R/C activity grows and grows!

Al Pinson's name rings a bell. In the '60s, there was a Southeast rebellion in pattern: Fellows like Al, Jim Kirkland and Jim Whitley made a big impact on pattern competition. Al Pinson led the way with his little trailer full of fine models. Traveling countrywide, his genial personality and fine flying let the pattern fraternity know that the South had something and was about to rise!

Finally, your response to the idea of forming of a "Vintage R/C Society" has been excellent. Remember that the more members we have, the more we can do, and your charter membership application form is available from Joe Beshar*. Do pass the word and act quickly! You won't regret it!

I've spent a whole column just catching up with some of your input. Next time: the story of R/C development at Purdue University in the late '30s. Little known, but very interesting; watch for it!

*Here are the addresses of people you might want to contact:

Richard Hodge, 9 Woodland Ave., Coventry, RI 02816.

William Mitch, 668 West 725 South, Hebron, IN 56441.

Harvey Sanders, 3006 Poston Ave., Nashville, TN 37203.

Joe Beshar, 198 Merritt Dr., Oradell, NJ 07649.

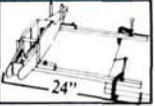
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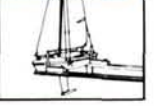


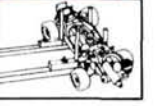
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COX ENGINES

(Continued from page 71)

somewhat slower with the spring-steel band on the muffler. I customarily leave mine off, though, for ease of priming the engine; there's no simple way to "choke" a Dragonfly!

Keep the needle set a trifle on the rich side. It takes experimentation to arrive at just the right setting for both reliable idling and high speed. When the engine has had a half hour or so of running time, it will become noticeably less difficult to operate it reliably throughout its speed range. Just remember: With a 7-3 propeller up front, your Dragonfly will never be a high-rpm screamer, so don't tweak the needle down to get the ultimate in rpm. Always leave the mixture slightly rich. Your engine is supposed to produce thrust—not noise—and with a 7-3 propeller, that's exactly what your Cox Dragonfly will do.

*Here are the addresses of the companies mentioned in this article:

Cox Hobbies, Inc., 1525 East Warner Ave., Santa Ana, CA 92705.

Ace R/C Inc., 116 W. 19th St., Box 511C, Hingham, MO 64037.

Graupner; distributed by Hobby Lobby, 5614 Franklin Pike Circle, Brentwood, TN 37027. ■

ABOUT THOSE ENGINES

(Continued from page 41)

of Roy Cox's former key men, Bill Selzer.

An old-time modeler whose experience goes back to pre-WW II days, Bill Selzer was well aware of the crucial importance

of high quality to the success of a model engine manufacturer. He lost no time in re-establishing the legendary quality-control system that originally put Cox motors at the very peak of 1/2A engine popularity.

Perhaps the biggest reason for Cox now being the one-and-only American 1/2A engine maker is superior product performance. At one time, K&B and Fox (the only other large U.S. model engine manufacturers) both made 1/2A motors. In fact, K&B originated tiny glow motors with the .020 Infant in early 1949. But when the first Cox .049s came along just three years later, their performance simply overwhelmed the competition.

Today's Cox Tee Dee motors have the most powerful size range in the world. Credit for the Tee Dee's basic design is largely due to Bill Atwood, who is America's most prolific model engine designer, bar none. Beginning with his Baby Cyclone in 1935, Bill was responsible for no less than a dozen distinct model engine lines. Among them were the Hi-Speed, Torpedo, Champion, Bullet, and Phantom spark ignition motors, and the Triumph, Wasp, Wen-Mac, and Outboard Marine glow engines.

With that wealth of model motor design experience to draw on, it's no wonder that Bill Atwood was able to perfect the Tee Dee engines to the point where their performance can't be significantly improved upon. (You *can* boost a Tee Dee .049's output a little by replacing stock

(Continued on page 89)

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FIELD & BENCH REVIEW

by RANDY RANDOLPH



PHOTOS BY L.F. RANDOLPH



The Charger in flight.

Sheri Smothers and the Thermal Charger; both make good friends!

GM Precision

THERMAL CHARGER

With unusual configurations in both engine placement and tail, this electric-powered balsa bird offers great performance.

ONE OF THE irritations that plague the electric flier is the occasional bent motor shaft from a somewhat-less-than-perfect landing. If you put together a design that eliminated that worry, added a few nice touches (e.g., battery accessibility and cooling) and wrapped a good-looking, good-performing package around it, you'd have GM Precision Products'* new electric sailplane, the Thermal Charger. So much for the concept; let's see how well GM carried out the assignment.

FIRST IMPRESSIONS: With the exception of fuselage sides, spars, sheet wood and nyrods, all the prefabricated parts, hardware and accessories are sealed in individual plastic pouches and stapled to the box. This has become a rather common practice, and I think it's a good idea! The label stipulates that, other than a radio, only three things are needed to complete the kit: adhesives, fiberglass and covering material. (I found no use for the fiberglass!) This is a very skinny shopping list! If your radio

doesn't have the elevator and rudder mixing function, you'll need a Du-Bro* Mixer; everything else, including motor and switch harness, is provided. A very complete kit!

The instruction manual is good, but it assumes that the builder is experienced. This isn't a beginner's airplane, so the manufacturer doesn't go into detailed explanations of techniques that have become second nature with most builders. It does what it's supposed to do: describes the order of construction and details unusual assembly and construction situations as they arise. The pictures are numerous and the descriptions fairly well-done. The full-size rolled plans are of good quality, and helpful, small, but important, touches are included on the plan. This is a very well-engineered kit!

The wood provided for sheeting, spars and all prefabricated parts is very pretty, but some of it is as hard as oak. To keep the weight of the finished aircraft as low as possible, the instructions

call for care in the use of adhesives. With the exception of spars and longerons, lighter wood would have helped considerably in this respect.

CONSTRUCTION: The first operation is to edge-glue the upper and lower sheet sections of the fuselage sides together. A novice might get into trouble here! Like all wood, balsa is subject to change with the humidity of its environment. How it changes depends upon how it was cut from the log and on what tensions were trapped within it during the curing and drying stages. An edge that was straight when cut can bow in or out (or both!) as its environment changes from the factory to your shop. The first step, therefore, is to make sure that edges to be joined are straight and true. If they aren't, straighten them with razor knife, a straightedge and a sanding block.

I pinned both fuselage sides together and added the longerons and uprights to both sides simultaneously, so there's no confusion about which is left and which is right. When finished, they can be sanded to the same outline.

All the bulkheads and prefabricated parts fit very well indeed; even the pre-drilled holes for the control-cable guides fit! A channel is provided for the antenna to route it through the fuselage so it is safe from the prop blades. Although the fuselage looks rather complicated, it isn't that difficult to build and, when finished, there's plenty of room for everything on the inside. Get ready for dust, because there's a bit of sanding to be done before those nice smooth lines are established.

The tail builds faster than any I've ever built, because there's so little to build! It takes longer to sand the dihedral bevel into the roots of the two halves than to build them in the first place! The way the control cables exit the fuselage up through the leading edge fairing is slick and simple.

The wing is the most time-consuming part of the whole project. It's a simple mono-spar with sheet trailing edges and a single 1/4-inch-square leading edge. The main spar is 1/4x1/8-inch spruce with double external webs in the center section and single webs in the tip panels. The top surface of the wing is capstripped from the leading edge to the trailing edge. The sheeted center section carries the motor mount and fairing.

I've never liked capstrips: It's much better to inlet the ribs to accommodate leading- or trailing-edge sheeting rather than to add more wood and glue to fill in the space. Capstripping only one surface is a good way to add internal fore-and-aft stress to a wing, and this can alter its airfoil. The instructions tell you to pin the wing down when adding the caps: very good advice, indeed! The finished wing looks great and is fairly light. Building the motor mount and fairing isn't as difficult as it first appears, and the prefabricated parts fit perfectly.

By following the instruction manual, I had no difficulty during construction, but there's a bunch of sanding on the motor and wing fairings, as well as on the wing tips. Incidentally, the tips are the kind that use a triangle block sanded to the top camber of the wing. In my kit one



This is the way it looks right out of the box. All prefabricated parts are packaged and easy to find.

SPECIFICATIONS

Type: Sport Electric Pusher

Span: 60 inches

Length: 35 7/16 inches

Weight: 38-44 ounces

Wing Area: 545 square inches

Wing Loading: 10-11 1/2 ounces per square foot

Power Required: 05 Electric (supplied)

Number of Channels Required: 3 (Du-Bro mixer required)

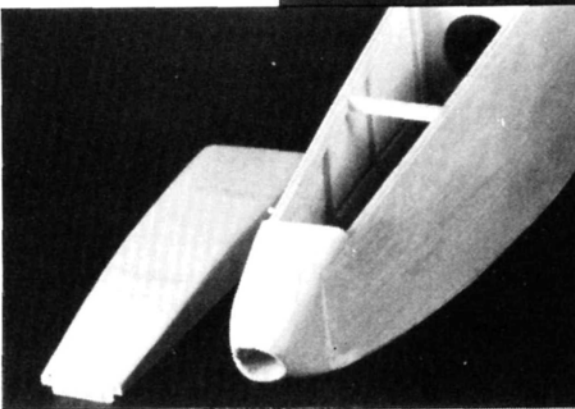
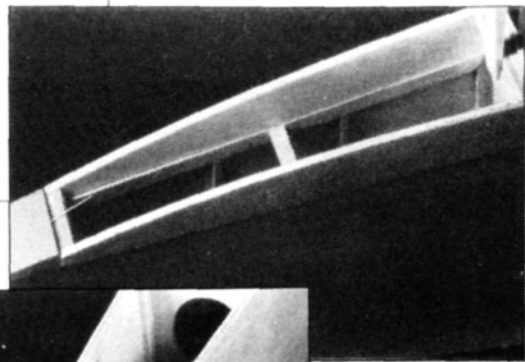
Suggested Retail Price: \$69.95

Features: Conventional built-up structure (balsa and ply), full-size plan, electric motor included.

Comments: Unusual-looking, but good-flying V-tail design builds fairly rapidly, but not for the brand-new modeler. The pylon/pusher configuration eliminates bent motor shafts and broken props.

If both fuselage sides are joined and the location of the uprights is marked on both sides at the same time, it's easy to add the uprights to the second side when the first has been finished.

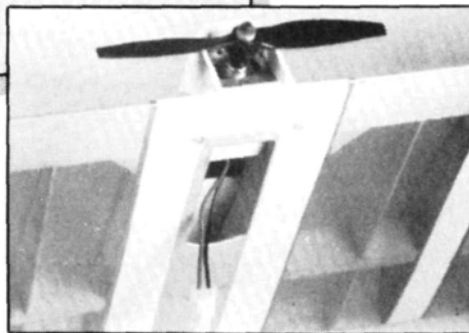
The battery hatch is built with prefabricated parts right in place on the fuselage. This way, everything fits.



When the nose block has been added, the battery hatch and the fuselage are sanded simultaneously so everything blends together. The temporary cross-brace across the hatch is removed after final sanding.



John Gill does the honors on a flight for the camera. Winglets just aft of the cabin keep fingers clear of the prop during launch.



Air enters through the nose scoop, flows over the battery, then through the opening in the wing center section and exits through the motor. Prop tends to act as an exhaust fan!

was very hard and the other soft. Needless to say, one took longer to finish than the other and, when finished, I had to add weight to the light tip to balance the wing.

I covered my Thermal Charger with Black Baron* transparent yellow and opaque white. A few places are a little difficult to cover: To achieve a smooth finish, the covering material had to be pieced together under the aft wing mount and around the motor fairing. A trim iron would be very handy in these areas, but my old travel iron was able to reach most spots. The way the ruddervator is mounted added little difficulty to the covering procedure. Don't forget to add the "finger savers" on each side of the fuselage below the prop!

To secure the wing and motor to the fuselage, a $\frac{3}{16}$ -inch dowel in the leading edge of the wing slips through a pre-drilled hole in the main fuselage bulkhead and two nylon bolts through the trailing edge and into the mount. You

must supply a 10-32 tap to thread the plywood mount to accept the bolts.

There's plenty of room inside the fuselage for radio, servos, switches, etc. The instructions suggest that you mount the servos on hardwood strips, but I opted for a plywood tray that I could move around before final installation. The motor battery box is a built-up affair that affords good air circulation around the battery during flight. After everything else is installed, this is moved fore or aft to properly balance the airplane before being glued into place.

PERFORMANCE: Because the motor turns clockwise, the propeller is mounted backwards, and this negates the need for a pusher prop. The kit supplies a 6-inch propeller that does a good job. With a fully-charged, 7-cell, 800mAh

pack, the Thermal Charger will climb way up there three times on a single charge.

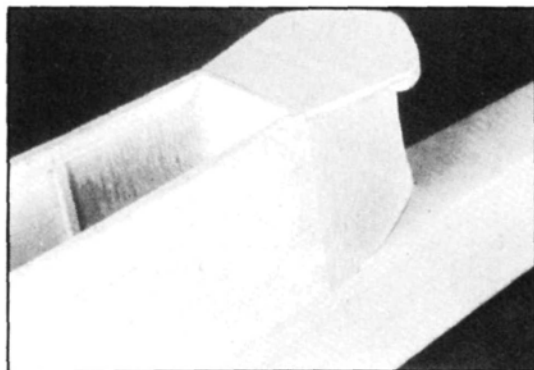
Control response is almost the same under power as in a glide, and this is very welcome in a 3-channel airplane. While the soaring ability isn't up there with the high-performance sailplanes, it's certainly one of the best electric-powered gliders I've flown. It's easy to make this airplane a friend!

**Here are the addresses of the companies mentioned in this article:*

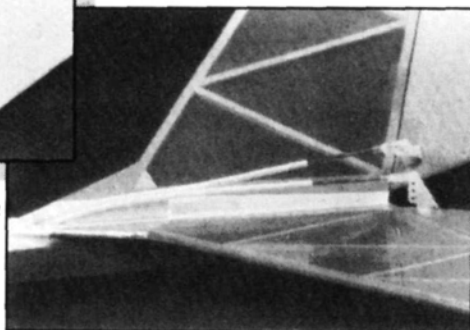
GM Precision Products, Inc., 510 E. Arrow Hwy., San Dimas, CA 91773.

Du-Bro Products, 480 Bonner Rd., Wauconda, IL 60084.

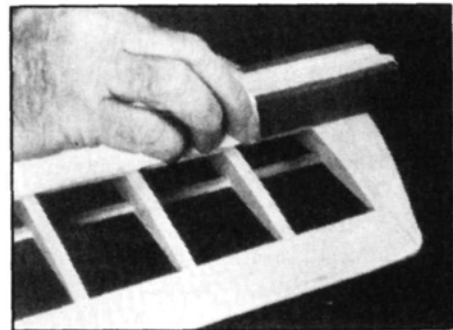
Black Baron; distributed by Coverite, 420 Babylon Rd., Horsham, PA 19044. ■



The aft cabin area fits together very well; it's a little tricky to cover, but really not that bad!



The nyrod control cables exit through the front of the ruddervator. Looks complicated, but is easy to do and makes a very clean arrangement.



The wing tips must be sanded to the same contour as the top of the wing. A sanding block that's half-covered with bond paper is the best tool for this operation.



Giant Steps

by DICK PHILLIPS

DURING THE PAST couple of columns, I've talked about recreating history, because that's what we model builders do as we build scale models. It has also become obvious to me that most of us who build *large* models are *scale* builders. While there are a few non-scale plans and kits around, the most popular ones are those of scale models.

Remember that the word "scale" can have a number of meanings. There's stand-off scale, sport scale, museum scale (and there's even "stand way off" scale!). How close to true scale we build determines the type of contest for which we're eligible. Whatever our particular interest, it seems to me that most of us big builders are more interested in building models that represent "real" airplanes than in building purely sport models.

One of the advantages of building scale models at the sizes in which we're interested is that they're considerably easier to detail than smaller scale models. Significantly more detail can be added to a 1/4- or 1/3-scale model than can be readily added to a model at 1/6 scale. Larger models can almost always cope better with the extra weight of detailing than a similar smaller model. Most scale models seem to "absorb" weight while under construction, and some smaller models don't fly well because of their high wing loading. I'm not claiming that such excessive weight isn't possible with a larger model, but it's a lot less likely.

Where the judging distance is the same



The size of this 1/4-scale Messerschmitt 110 is apparent in this photo. Its sheer size allows for considerable detailing. Such detailing is a great deal easier than if the model was done in a smaller

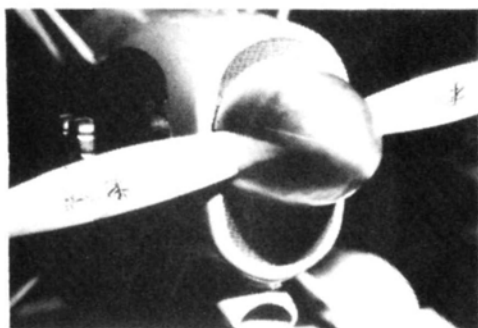
for all sizes of models, a larger model shows detailing better than a smaller one, and this can't help but affect a judge's perception. That greater visibility means that detailing must be well done, because any shortcomings will be obvious and will rightly result in lower scores.

There's a great deal of interest in the heavy iron WW II Warbirds. The P-51, the P-47, the P-39 and others of the type are very popular, as is borne out by the numbers that appear at meets and rallies around the country. The same thing ap-

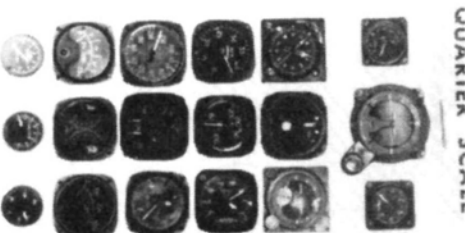
plies to the number of available kits and plans for such airplanes.

As I've mentioned before, when a builder does a very good job on a model, his friends convince him to enter this great model in a local contest, and he then has to hustle around to find the documentation required for entering the contest.

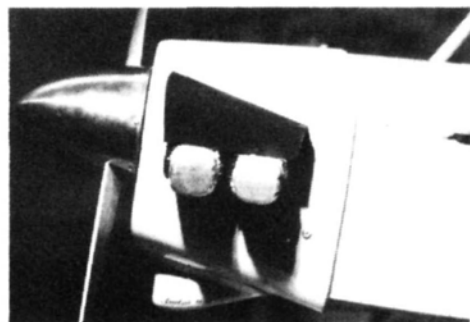
While this is understandable, it *isn't* the best way to build a scale model. You should gather your documentation material *well before* starting construction. Most of us have favorite airplanes, and we



The use of light screening over cowl opening approximates original airplane, hides engine and allows adequate air flow for engine cooling.



Scale instrument faces add considerable cockpit realism. They, too, require considerable work in assembly and positioning.



Commercial light-plastic engine kit provides realism at light weight and does require some work in assembly and painting.

gather information on them for our eventual construction of that "someday" ship. In many cases, we gather the material for years before ever planning to build the model. I do this myself and have a long list of someday airplanes for which I now have a considerable amount of documentation.

When it's eventually time to start construction, the collected information must be drastically "winnowed" to reduce it to a manageable amount of usable material. If a specific airplane has been selected as a modeling subject, the weeding out of extraneous material isn't all that difficult. You use only material that applies to that airplane except for "generic" materials like a three-view or other drawings.

So why gather the documentation before starting construction? Simple! If changes in the structure are required, such changes are much more easily incorporated during construction than at a later stage. Most airplanes were subject to changes during the time they were built and sold. Such differences might or might not be detailed in a kit or plan, so builders must make them themselves.

When working from a plan, making changes isn't a big deal. I'm not suggesting that you make changes for the sake of making changes. However, where they're needed, don't be afraid to make them. Most of you who have been building for a while will know what works and what doesn't; newcomers probably won't feel comfortable making changes themselves,

but club members and friendly modelers will usually offer to help.

A kit might be a different matter. Some kits don't lend themselves to easy alterations, but the alterations we'll have to make to accommodate scale documentation won't be that drastic. If the kit has been chosen well to duplicate the original airplane, small changes won't create large problems for you.

Keep in mind that full-scale airplanes are rarely perfect. In any manufacturing process, there are bound to be imperfections, which might take the form of minor differences in finish, form and performance. If your model isn't quite perfect, that *isn't* a defect. In the Classic era, when airplanes were built by hand, it was extremely unlikely that any two would be identical. In the case of the Beech Staggerwing, the stringers that supported the fabric skin were "eyeballed" into position before being fastened into place. This ensured that the lines showing through the fabric "faired" smoothly and looked good. For this reason, it's unlikely that any two were identical.

When the model has been properly built, you'll make most use of the documentation when you're completing the detailing and finishing. Obviously, you shouldn't use documentation that doesn't support the model, but you should add all the details that are shown in the documentation, whether this is photographs or three-views. The idea is to show what the original looked like and to match it with

the model. I'm not encouraging you to be devious here, but there isn't a lot of sense in showing material that proves your model *isn't* a good rendition of the original airplane. It does make good sense to emphasize the features you've included in the model.

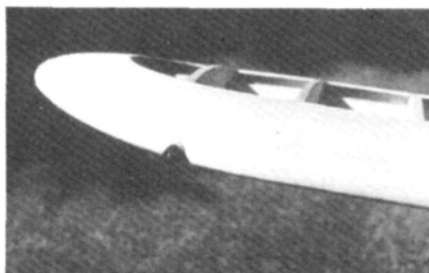
Painting and detailing of a model often opens a large can of worms. For example, in a high-level scale contest, the builder must establish that his colors are accurate. Several paint manufacturers provide formulas that allow builders to mix a color that will accurately match that of the original airplane.

However, a number of things affect the eye's perception of color, e.g., the size of something can affect the way we see its color. If we placed a full-scale airplane and a model painted with the same paint side by side, they wouldn't necessarily appear to be the same color. Using photographs as color documentation also has some pitfalls because the materials used to take and print the pictures can affect the color, as can the time of day at which the original picture was taken. Even if your model is painted with *the same* paint as the full-size airplane, they won't look identical because the full-scale airplane spends most of its time in all kinds of weather, and your model is outside for only short periods. All paints and colors alter over time; this depends on where they're stored and what conditions the painted surface encounters.

(Continued on page 84)



Attention to underlying detail, as on Dario Brighella's Waco ARE, provides the base upon which to apply the surface detail that makes for a contest-winning model.



The use of small model railroad-type lights may be used for nav and clearance lights on models. Sizes must be chosen carefully to maintain scale accuracy.



Paul Butcher of Ontario, Canada, builds excellent scale models. This Curtiss racer looks like it's in the right place on its scale floats. It appears Paul even found some scale waves for the photo!

CLUB OF THE MONTH

ROTATE

The St. Louis Radio Control Flying Association of St. Louis, MO, is the *Model Airplane News* Club of the Month for May, 1989.

This year, the club will host the tenth Scale Masters Championships, and this itself is proof of the high caliber both of the club's organization and of its members.

With approximately 100 members, there's a wide variety of fliers who fly all types of models, including helicopters. Since St. Louis doesn't enjoy year-round warm weather, the members must either sit and wait for spring or, as many do, brave the elements.

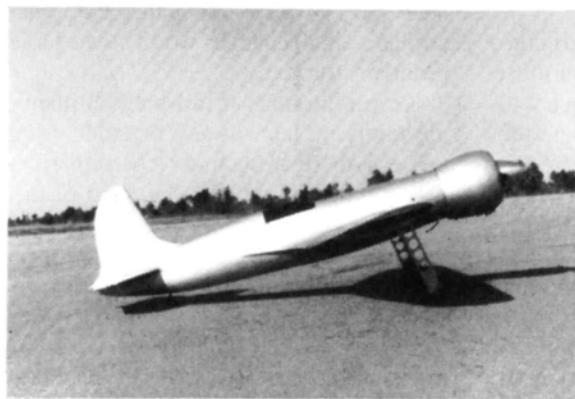
An article included in "Rotate," the club's monthly newsletter, outlines some helpful hints to cope with flying in below-zero weather. It's from Don Freestone, of the Midnight Sun R/C Club in Fairbanks, Alaska, so he should know what he's talking about! Most of the information suggests that fliers should keep all equipment warm! Not too easy to do in freezing weather! Nevertheless, this, along with a number of other informative articles, makes for a quality newsletter that the members enjoy. Other relevant articles include those about noise prevention, night flying (for which the writer actually waited until it was pitch black, then took up his plane with a strobe system and a light shining through its translucent MonoKote!), how to be eligible for the Scale Masters, the benefits of spinners, and more. In short, a complete package.

Model Airplane News is pleased to award two 1-year subscriptions to the St. Louis Radio Control Flying Association, which will give them them to a couple of the club's outstanding members. Good luck with the Scale Masters! ■



GIANT STEPS

So it's very difficult to reproduce colors and to authenticate them, but it's also very difficult for a judge to fault such coloration, providing it's as good as you can make it. Frankly, I've always had some pretty severe reservations about downgrading static points for color mismatching—unless it's really a *long* way off what it should be. Markings are a different matter: Good documentation shows which markings were used on the original and where they were placed. If they aren't done well (according to the documentation you supply) then you'll lose marks, and you'll deserve to do so.



A super-easy model to detail is this Hughes H-1 racer. The original racer didn't have a lot of detail, so only minimal finishing is required on the model. Such an unusual subject also often attracts favorable attention from the judges.

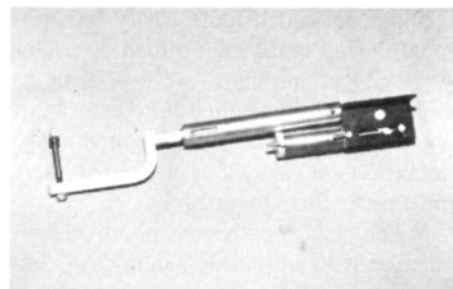
I mentioned the documentation you supply: Obviously, you'll use what best matches your model. A judge is required to use *your* material when judging your model, and if they match, he doesn't have much excuse to downgrade your static marks. From time to time, you might run into a judge who knows the original airplane very well and can call on this knowledge. If his knowledge contradicts your documentation, you could be in trouble, but the chance of running into such a judge isn't all that great and it won't happen often. Besides, a judge is *supposed* to use *your* documentation material to judge your model.

Sometimes, we build scale models without any intention of entering them in contests. The satisfaction of creating a nearly perfect reproduction of an original airplane is reward enough for this exacting task. (Of course, the admiration of those who see it is something of a reward as well!) If the opportunity and the desire to enter a contest do materialize later, at least we're ready for the challenge.

Just *building* a great scale model isn't enough (unless it's intended strictly as a display model, or is built on contract for

display). The thing should *fly* as well as look good, and that's where some scale builders fail badly, because a really heavy scale model usually doesn't fly well. In addition, many excellent builders lack the skills to fly their creations well. After all, if you spend most of your time at the building board or in the paint booth, you aren't getting the flying practice that's required to become proficient.

When building what will become a beautifully detailed model, an inexperienced pilot is well advised to choose one that has every chance of being a good flier, too. In this way, he or she can prac-



Several firms now produce scale landing-gear legs with oleo-like action. Additional detailing may be added to duplicate a specific airplane leg.

tice with a great model that isn't in danger of re-kitting every time it's flown. Once built, the model should be flown frequently to build up skills to the point where more sophisticated models can be tried. This natural progression will provide a great deal more pleasure and waste a lot less time and money.

Next month, I'll go into the flying of a great scale model and give you some details about how you can improve your flight scores by flying the model properly. See you then. ■



Quiet Flight

by JOHN LUPPERGER

SOLVING PROBLEMS is a big part of our hobby/sport. Some of the biggest advancements have come about because someone said, "I can make that work!" If it weren't for these individuals, the rest of us would still be saying, "There's just got to be a better way."

A Better Turnaround

One of the all-time great solutions was the winch-line retriever, but its use brought problems of its own making, e.g., when the winch line wraps around the turn-around and snaps the retrieval line. This usually happens only when it's windy—you know, normal contest weather!

Steve Hendry, flying buddy and fellow member of the Harbor Soaring Society of Costa Mesa, CA, has come up with a great



Above: The author with his new Explorer 2M glider. Model exhibits great flying characteristics that should make it good for the beginner or expert.



Left: Simple mechanical mixer allows aileron/rudder mixing on basic radio without electronic mixing.

solution. Steve was at an industrial trade show, saw some pulleys and had an idea for a better turnaround. I hope the pictures give you a good idea of how Steve's turnaround is put together. The pulley has a curved inner surface instead of a V, and it appears to be made of glass-filled nylon. It's supported on both sides by ball bearings, the sides are wood, and the base is aluminum.

The two wooden sides taper down at the back to blend with the base, and this taper is what prevents the winch line from snagging on the turnaround and subsequently breaking. No matter how the winch line falls on the turnaround, when

the retriever pulls the line back, it simply slides up the wooden sides.

So far, the pulley has held up during several Sunday flight sessions, and if we find no problems after a few month's use, I hope I'm able to convince Steve to make them available for purchase. I'm sure clubs that use retrievers during contests would find one of Steve's turnarounds useful. I'll keep you informed as testing progresses.

Simple Mixer

This is a case of necessity being the mother of invention. George Joy, also of the Harbor Soaring Society, recently pur-

chased and built a Larry Jolly Cheetah, which is a rudder/elevator/aileron/spoiler-controlled, high-performance, thermal glider. Like most multi-function gliders, the Cheetah is easier to fly when the ailerons and rudder are coupled.

George's problem was that he didn't own a radio with mixing functions. He could have used a Y harness, but that would have meant that the functions would be coupled all the time. George wanted to retain separate control of the rudder, and he found the Y harness unacceptable. That's when he came up with his transmitter mixer.

As you can see from the photographs,

it's a really simple setup. There's a small plate inserted under the top adjustable portion of each stick, and a small hole is drilled in each plate to mount a bolt-on ball link. These are connected to one another with a rod and two ball caps. The spoiler/rudder stick is then held under tension with a rubber band attached to the back of the transmitter case. (This keeps the spoilers closed when operating the rudder.) Simple, but effective!

When using the ailerons, rudder is automatically mixed in, but owing to the amount of rudder-to-aileron differential, when the rudder is used alone, there's less aileron input. This allows you to use the rudder for yaw control during launch when you don't want the roll action of the ailerons.

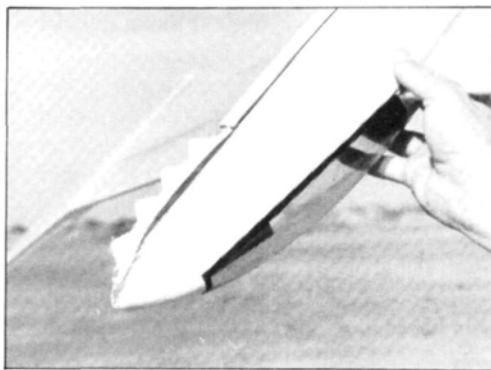
I've watched George fly with this setup for a couple of months now, and it seems to work quite well. With this simple mixer, he's able to fly a multi-function model with a simple radio without mixing capabilities.

Just When You Thought...

Yes, just when you thought everything was OK and you finally had the facts right, the facts change. Last month, I told



Simple off-road tire skid is quite effective and safe. Stops model in a relatively short distance.



Hard plastic skid will stop a model in quick order, but is it safe? More in text on the safety of today's skid designs.

you that the rumors about Wilshire Hobbies closing weren't true—straight from the owner's mouth!

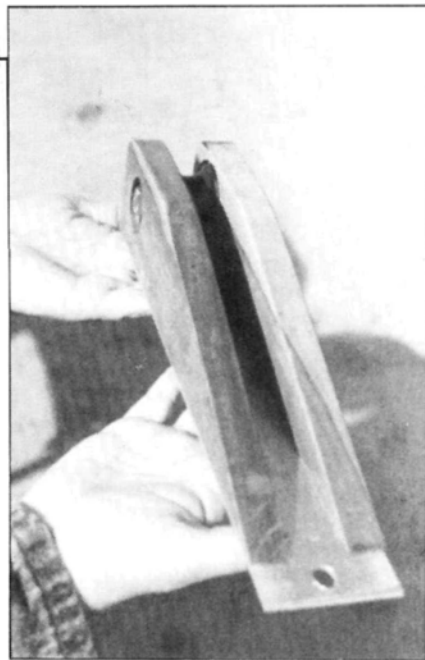
Since then, Bob Ratzlaff has informed me that the situation has changed, and that Wilshire Hobbies *will* be closing. Wilshire has been a fixture in Southern California for a long, long, time and will be sorely missed. Bob says the high exchange rate of the German mark made importing kits impossible, so he decided to push domestic products, but he couldn't compete with the mail-order companies. Wilshire Hobbies, we'll miss you!

Skids, Are They Becoming Dangerous?

If you compete in glider contests, you know that most events are won or lost in the landing circle. When there's lift, everyone makes his time, and the winner is the one with the highest landing points.

Since the landing has become all-important, landing skids have become almost as important as the airfoil you use. If you can't stop on a dime, you can't get the big landing points. What's a guy to do? Well, if you follow the prevailing trend, you come up with skid that will stop your model within a nanosecond after touchdown.

So what material do you use? A few years ago, the rubber-doormat skid was popular, you know—the type with little rubber nipples. Then came the artificial-grass doormats; ugly as sin, but fairly effective for the floater types. Then we



"No snag" turnaround designed by Steve Hendry. Unit works great and puts an end to broken retriever lines. Same design could be built using a bicycle hub.

started to understand the advantages of higher wing loadings, and these skids were no longer adequate.

Some people started using off-road car tires; 1/8-scale seemed to work best, especially the knobby type. These worked quite well on most fields, but tended to slide on wet grass. Then some enterprising glider guider discovered Goldberg* wing tip skids. When you turned them around backwards and glued four to 10 of them onto the nose of your glider, you could actually stop when you arrived at the landing circle. And they worked on any surface except a paved runway. The only problem was that they tended to break off and, of course, this would usually happen at a contest.

Enter the next step in the evolution of the skid: hard, plastic machined teeth in a strip. These babies worked just as well as the Goldberg skids, and depending on the shape of the teeth, sometimes better. As well as this, since they're held on with screws at their ends, instead of just glued, they stay put. Their only drawback is the material of which they're made; after a while, the plastic teeth start to wear down and become less effective.

Natural progression: Use a harder material—metal! These skids range from



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QUIET FLIGHT

music-wire spikes to multiple rows of machined-aluminum teeth (some are pretty frightening!). If someone were to receive a glancing blow from one of these metal skids, they'd be cut to ribbons, so the SC2 association (made up of seven Southern California clubs) has decided to ban any type of metal skid forward of the tow hook at all of their group events. In my opinion, this is a good move toward safer glider flying, but is it enough? I've heard some people say that they think the hard plastic skids are just as dangerous as the metal ones.

Is it time for the AMA to look at this problem and to make a rule governing the use of glider skids? Let's hear from you; you're the ones who would be affected by such a rule. Let me know if you think we should leave things as they are or restrict the type of skids that are legal.



Height of attachment point gives more rudder than aileron movement. This differential allows more yaw control when using the rudder alone.

New 2-Meter Glider

As many of you already know from my previous designs, my favorite glider is the 2-meter: the Allure, Harlequin and Gnome 2M are my 2-meter designs, and all have been kitted.

Global Hobby Distributors* will soon

Explorer 2M Specifications

Wingspan: 2 meters

Area: 574 square inches

Aspect Ratio: 10.06:1

Root Chord: 8 inches

Tip Chord: 6 inches

Airfoil: Clark-Y

FUSELAGE:

Overall Length: 44.5 inches

Widest Point: 1.75 inches

HORIZONTAL STAB:

Span: 18 inches

Area: 76.5 square inches (13.3 percent of the wing area)

VERTICAL STAB:

Height: 7.75 inches

Area: 38.75 square inches (6.7 percent of the wing area)

enter the kit market and its first model will be a 2-meter glider that I designed. Known as the Explorer 2M, the glider was designed for beginners to learn on, but it also offers enough performance for experienced pilots. Many models make this claim but, in my opinion, very few actually live up to it. It seemed like an interesting challenge, so following Global's design criteria, I started to put my ideas on paper.

The two most striking features of the Explorer are its thin fuselage and long tail moment. Although the fuselage is quite narrow, it will actually accommodate a 500mAh battery, a full-size receiver and up to three full-size servos. The tail moment, from mean aerodynamic chord of the wing to mean aerodynamic chord of the stab, is 30 inches, or 3¹/₂ chord lengths. I've flown several European designs with long tail moments and was really impressed with their handling characteristics (as related to the tail moment). These models were very smooth in pitch and in turns, and tended to follow a cleaner track without any jerky motion. These are characteristics that can definitely help a beginner while also making more experienced pilots fly a smoother line (especially when working light lift).

The Explorer is also very rugged. The forward part of the fuselage is light ply and the rear is balsa; the tail surfaces are built-up balsa with sheet control surfaces. The wing is full D-tube with I-beam shear webs and 1/8x3/8-inch spruce spars, and a beginner will be able to learn winch operation without the worry of hurting this wing!

I took the Explorer to the January HSS Club contest and entered it in 2-Meter and Open. The model flew very well at a flying weight of 36.5 ounces and a wing loading of 9.1 ounces to the square foot. As a matter of fact, it flew well enough to get me 1st place in *both* classes. Not bad for its first time out!

Several people have flown the model, and the consensus is that the Explorer 2M will be an excellent trainer. I've also added 1/2 pound of ballast to it and have found it to be great for the contest flier. I don't know the price yet, but the model should be available shortly after you read this. Look for it at your local hobby shop.

Till next month...good thermals and a full charge!

**Here are the addresses of the manufacturers mentioned in this article:*

Carl Goldberg Models, Inc., 4734 West Chicago Ave., Chicago, IL 60651.

Global Hobby Distributors, 10725 Ellis Ave., Fountain Valley, CA 92728.

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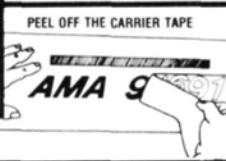
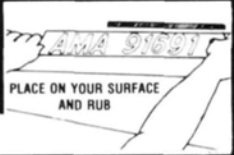
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ABOUT THOSE ENGINES

(Continued from page 76)

factory parts with customized competition versions, e.g., the chrome-plated pistons and other hop-up components sold by Gene Hempel, of the P&G Metal Shop*.)

To sum up my reply to Randy's inquiry: Even with the latest in high-precision equipment, it isn't as easy to succeed in model engine production as it looks; and when motors are as good as Cox's are,

it's practically impossible for another company to design and manufacture a better product with which to compete against them.

*Here are the addresses of the manufacturers mentioned in this article:

Cox Hobbies, 1525 East Warner Ave., Santa Ana, CA 92702.

Eric Clutton, 913 Cedar Lane, Tullahoma, TN 37388.

K&B Manufacturing, 12152 Woodruff Ave., Downey, CA 90241.

Airtronics, 11 Autry, Irvine, CA 92718.

P&G Metal Shop, 301 N. Yale Dr., Garland, TX 75042.

Airtronics, Inc., 11 Autry, Irvine, CA. 92718. ■

ARF ASSEMBLY

(Continued from page 44)

Mylar. After gluing the patch, cover the cut lines with vinyl tape. If the patch fits so tightly that the CA won't pass through any cracks to the foam, you can cover the cut line with thick CA, and you won't

(Continued on page 100)

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Small Steps

by RANDY RANDOLPH



Families that fly together stay together! Sweet Leilani is in the middle.

THE 1ST ANNUAL Small Steps Fly-in will be remembered for its winds that gusted to more than 30mph on the first day! Since Joe Wagner did a write-up last month on all the fun that went on during those two days, I thought I'd broaden the picture by giving you some additional coverage.

On the next page, you'll see the photo of the front end of Steve Staple's Luton Minor, and the engine shown is a venerable OK Cub .049. At one time, there were thousands of these engines flying all kinds of airplanes in all kinds of places. Just about everyone who has been in modeling since the '50s has owned at least one Cub engine, and they're still available—maybe not new, but certainly “run-able,” and at a very reasonable cost. Write to Ted Brebeck* for a list of what's available. (It wouldn't hurt to send a dollar or two along with your request.) The Brebeck family has been associated with OK engines for a long time.

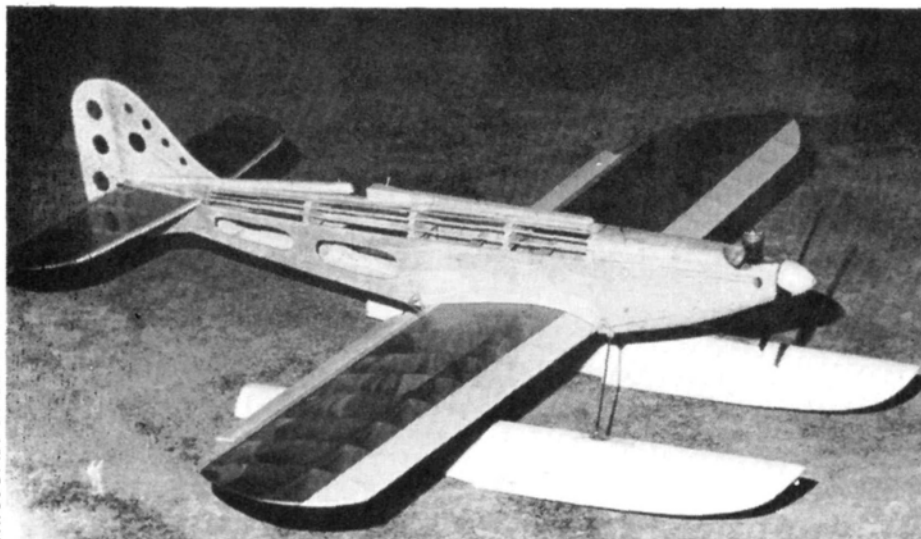
A word about the fellow who flies the above-mentioned Luton Minor is in order.

Steve is a product of the modeling environment created by J.L. Sadler and H.A. Thomas in and around Little Rock, AR. Steve and his friends Paul Wellenborg and John Westbrook fit right into the mold set by those other famous men. The country around Little Rock is blessed with the most wonderful things a modeler could wish for: sod farms. They're like hundreds and hundreds of acres of flat, green lawn! No wonder Arkansas has produced so many good modelers.

Joe Doyle in Lockport, IL, reminded us that, to some extent, this column has been neglecting the “hot” small airplanes. In response, I've included a photograph of a Pseudo Supermarine, which is the design of Jerry Small, who's very well-known in racing circles as the designer and producer of fiberglass Formula 1 and Quarter Midget racers. When he moved to a new home with “just the right-size lake” next door, he thought a small floatplane would be just the ticket for evening flying. With a 3-channel radio and hot TD .051, the all-up weight should be in the order of 20 ounces, ready to fly. The floats are made of foam and balsa. Actually, they're upside-down “Us” with sheet-balsa bottoms, so they're hollow and very light.

Not all hot airplanes are powered by engines; some have motors! The first photograph shows Jaime and Lani Colley with their original Sweet Leilani. It's powered by an AP29 electric with a 6-cell 800mAh pack, and it is, indeed, sweet. Electric airplanes are becoming rather commonplace, because good flying fields can be found for these clean, quiet birds right in the center of many cities.

The final picture shows a sight that a few of us old-timers might recognize as a pre-WW II free-flight contest with the old birds clawing for altitude. Some of the fliers are indeed old-timers, but the airplanes are strictly from the '80s. They're competing in a last-one-down-wins competition, and all are powered with 05 geared electric motors. These airplanes



Jerry Small's creation looks good now; just wait till it's finished!

PHOTOS BY RANDY RANDOLPH

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Before looking at the text can you identify this engine?

can climb very high, four or five times on a single charge. The designation of 05 is a carryover from earlier days and was an arbitrary term applied to motors that were supposed to be equal to the power of a 1/2 A engine. Many electric airplanes kits now include this type of motor right along with the balsa boards and sticks, and they're reasonably priced.

It's a common practice to scale-up plans from three-views or old magazine plans to build a scale airplane, but there are also those of us who want to scale



Three imitation old-time birds. "Last-one-down" competitions are getting very popular at electric fly-ins.

plans down to make airplanes that correspond to our unique tastes. Jim Pepino's Scale Plans and Photo Service* can do both. His new 66-page catalog of plans tells all about his service, and \$4 brings it to your mailbox.

* Here are the addresses pertinent to this article:
Ted Brebeck, OK Engines, P.O. Box 355, Mohawk, NY 13407.
Jim Pepino, Scale Plans and Photos Service, 3209 Madison Ave., Greensboro, NC 27403.



1989 HELO-CALENDAR

Hover Lovers will enjoy this long awaited calendar that is devoted strictly to helicopters! This all new calendar features remote control and full size helos, and we might add is intended to convert fixed-wing pilots! The 1989 HELO-CALENDAR is loaded with trivia, date facts, important events and birthdays of those who have contributed to the advancement of rotary-wing aircraft. Color pictures printed on high-quality printing stock accompany each month. Measures 9" x 12" (12" x 18" open).

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Helicopter Chal

by CRAIG HATH



PHOTO BY CRAIG HATH

Above: These shots of a nice Hughes 538 were captured at the local field. Mechanics are GMP Shuttle, and fuselage kit is available from Circus Hobbies. Flight qualities appear very good, and the owner told me that the fully painted body he installed added virtually no weight! He even feels that the ship might weigh slightly less than the pod-and-boom version.

THIS HAS BEEN a really tough month for flying. Even here in the desert, the weather just hasn't cooperated. As I write this, we're in the middle of the big Arctic blast that hit the entire country early in February, and have been unable to spend any time flying during the last three weekends. I begin to know how some of you who live in colder climates feel. You have my sympathy!

On the bright side, the break has allowed me time to re-acquaint myself with some of the projects that have been waiting on the back burner and to finish some of those neglected inside chores. One project that I've been putting off was a climb into my attic to see just what's hiding up there. Surprised to see that there's a lot of junk up there that shouldn't be in *anyone's* possession, I swiftly filled a 55-gallon garbage bag with miscellaneous goodies like crashed helicopter parts completely beyond repair and numerous empty kit boxes (partially empty?)—whatever! For some reason, I once thought that this stuff would be valuable when the price of scrap metal came back up—or something! At any rate, it was pretty worthless and just an exercise in futility to keep things like severely bent main-frame sets, crushed servo trays and bent main-

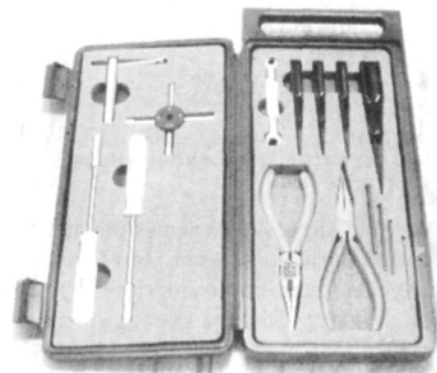
shafts. There were even a couple of fly-bars that had been twisted over themselves. I guess my point is that if you don't intend to do something with the stuff right away, it's probably advisable to pitch it *now*, unless you cherish the idea of studying bent parts on a rainy day!

I've been working on a series of articles that focus on the process of flight training. Last month, I talked about gaining finesse and confidence in forward flight as a preparation for learning basic aerobatics. This month, I'll look at one of the basic maneuvers: the Hammerhead, or stall turn. Then I'll discuss adding some extra zing to that basic maneuver.

Let's take a shot at our first stall turn. Before I actually begin to describe how the stall turn is performed, let's examine what a stall turn is and consider its effects on the model helicopter. The stall turn begins from level forward flight. Most of the time, the machine will be moving at almost full speed and as the maneuver begins, the nose of the helicopter is pulled up to the vertical position, and the helicopter moves upward vertically until almost all the forward airspeed is "bled off." Just before the helicopter stops moving, the tail is kicked around and the nose is pointed at the ground. Air speed is

regained as the helicopter moves vertically downward, and the nose is pulled back to the level position, exiting the maneuver at the same altitude as the entry. The helicopter should enter and exit the maneuver at the same spot, creating an imaginary "L" if viewed from the side.

With a little imagination, it doesn't take much to realize the control inputs needed to perform this maneuver with a radio-control helicopter. But just in case you're stumped, I'll go over the whole thing from the beginning. With the helicopter moving along in fast forward flight (preferably headed into the wind) pull back on the pitch-cyclic (or elevator) control stick until the nose of the helicopter is heading straight up. (Be sure that you give yourself plenty of altitude at first, until you become comfortable with the maneuver.) When the helicopter is perfectly vertical, release pressure from the stick. It's a good idea to bring the throttle and collective back to the point where rotor-blade pitch is zero, as this will prevent the helicopter from trying to pull itself over onto its back. This part might take a little practice, as some helicopters may need some cyclic-pitch corrections to keep the nose going straight up. If the helicopter falls out of the vertical



The new Kalt tool set has just about everything you'll need to build, maintain and repair your helicopter in the shop or at the field. Should be available now; see text for details.

will prevent the helicopter from trying to pull itself over onto its back. This part might take a little practice, as some helicopters may need some cyclic-pitch corrections to keep the nose going straight up. If the helicopter falls out of the vertical climb (either on its back, or forward), simply let its nose drop slightly, and recover to level flight as the air speed returns. Repeat the process until you can get your machine to go straight up without problems.

Now, as the vertical air speed drops off, try to catch the helicopter just before it stops dead in the air. If you've cut back the throttle to zero pitch, open it back up to about halfway, and grab either left or right tail rotor to get the helicopter's nose to rotate around and point straight down. You'll probably have to practice the timing on releasing the tail-rotor control, because there will often be a lag in response from the time the control is released to when the nose of the helicopter stops turning. Let the helicopter proceed down the line on which it went up and, as it nears the point of entry, gently pull back on the pitch cyclic, bringing the nose of the helicopter back to level, ease off the back cyclic, and be sure that the throttle is reopened for normal forward flight. Maneuver complete! The stall turn doesn't require any special set-up or modifications to improve the helicopter's ease of handling through it. If your helicopter will go into forward flight and operate dependably at high speed, it will do some pretty nice stall turns.

As your confidence improves, you can add another dimension to the stall turn. The 540-degree stall turn is performed by holding tail-rotor control as the helicopter spins around 1 1/2 times vertically at the point where it would usually turn only 180 degrees and head down. (Some people refer to this maneuver as a pinwheel.) Be sure that you *stop* the rotation with the nose pointing down. Depending on your helicopter and the amount of tail-rotor control you have, you might find your machine spinning wildly up there. While

this looks great to spectators, it can at first be a little unnerving for the pilot. Try the 540-degree stall turn with extra altitude for the first attempt, so that you have room to recover if you get into trouble. If you try to stop the helicopter with the nose pointed upward, you can get it into a tail slide, but this isn't a problem if you don't panic. The best way to exit a tail slide is by pushing forward on the pitch cyclic (provided that you're looking at the top of the helicopter) while opening the throttle enough to get the helicopter moving forward again.

So there's another dimension to add to the stall turn. You might want to practice the tail slide in its purest form: Simply pull the helicopter up to vertical from forward flight, and allow air speed to decrease to the point where the helicopter is sliding backwards on its tail. Push the nose forward, and open the throttle to recover.

The stall turn is a basic maneuver that can be combined with other basic maneuvers to make complex aerobatics. The model helicopter has very limited vertical ability if you point the nose straight up. You can get some extra vertical climb by opening the throttle all the way while holding forward cyclic pitch to keep the

nose on the up line. The results of this practice can be a little unpredictable, as the effects of gravity overcome the force of kinetic energy coupled with aerodynamic lift. So if you decide to experiment with this technique, be prepared to fly out of some *unusual* attitudes! As I mentioned earlier, it's usually best to get the nose of the helicopter heading downward and gently recover to level flight. Just try to stay cool through the hairy parts, and be sure to be practicing with plenty of altitude.

New Products

- The new Universal Pitch Gauge from Miniature Aircraft USA* (part No. 0526).

The Universal Pitch Gauge was designed to be used on virtually any brand or model of R/C helicopter, and it's especially effective on models that incorporate the underslung flybar, e.g., their X-Cell line of machines. Miniature Aircraft recommends that a flybar-locking device be used in conjunction with the Universal Pitch Gauge. Since the flybar is the reference point, it must be locked at exactly 90 degrees to the main shaft to ensure accurate results. Miniature Aircraft offers a

(Continued on page 122)

Below: The new Universal Pitch Gauge from Miniature Aircraft USA will do more than just allow you to set the pitch of the main rotor blades. You can also use it to set up flybar paddle alignment, and it will work well with just about any machine available.



Above: Here's a close-up of the measuring scale on the Miniature Aircraft USA Universal Pitch Gauge. Not too many of the gauges on the market offer a full 30 degrees of range like this!

Product News



W.R. BROWN SINGLE-ACTION AIR- BRUSH

W.R. Brown, manufacturers and suppliers of compressors and paint-spray equipment since 1921, has introduced a single-action external-mix airbrush particularly geared toward the needs of modelers. A simple brass nozzle assembly that breaks into three essential parts, a wide-mouth jar, and high-density polymer body, make clean-up exceptionally quick and easy. A lightweight design, flexible hose and angled handle are specifically designed to facilitate three-dimensional work. The unit rests on any horizontal surface with no need for an airbrush hanger.

The most unique feature of the airbrush is that the jar and nozzle assembly is totally removable. Colors can be set up in advance and snapped into and out of the holder as needed, without bleed-through or cleaning between color changes. Switching from color to color, different viscosity materials, or nozzle sizes is literally a snap, and there's no cleaning interruption.

For more information, contact W.R. Brown, 901 East 22nd St., North Chicago, IL 60064.

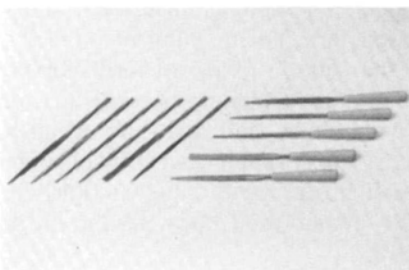


BOB VIOLETT MODELS AGGRESSOR

The Aggressor II is a finely tuned upgrade of the very successful original Aggressor performance jet by Bob Violett Models. The new model has a

longer, wider landing-gear stance, improved aerodynamics and simplified construction methods. Specially designed and molded carbon-fiber accessories provide for wing mounting, shock mounting of the landing gear, and two different types of adjustable servo mounts. All ducting is epoxyglass molded, and the parts key together for error-free assembly. To provide straight, strong flying surfaces, the Magna-Core wing is a combination of foam, balsa and carbon fiber. Time trials at the recent Tangerine Fan Fun-Fly yielded a low speed of 35mph and a top end of 187.7mph.

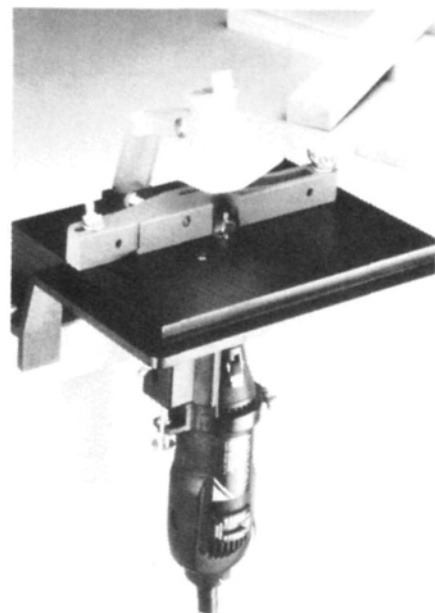
For more information, contact Bob Violett Models, 1373 Citrus Rd., Winter Springs, FL 32708.



MASCOT PRECISION TOOLS FILE SETS

Mascot Precision Tools offers two important file sets for the hobbyist. The Wood Rasp Set has five of the most-often-asked-for shapes: equalling, flat, half-round, round, and three-square with a wide tooth design preferred for giving a rough surface to wood or plastic. Their overall length is 5 1/2 inches, and plastic grips make them easy and comfortable to handle. A sturdy plastic pouch protects them from damage and dust in your toolbox or storage drawer. Also offered are Swiss Single-Cut Files. These top-quality, miniature files get plenty of use smoothing, deburring and shaping work in metal, wood, or plastic. Files are fine-cut 5 1/2-inch hard-chrome steel, and they have handles shaped for firm gripping. The single cut means less clogging and easier cleaning. The set includes six popular shapes: round, half-round, square, flat, three-square, and equalling, all packaged in a vinyl pouch.

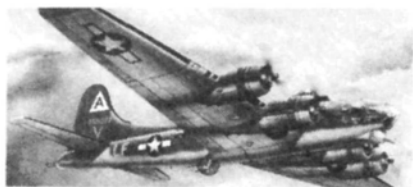
For more information, contact Mascot Precision Tools, P.O. Box 243, Carlstadt, NJ 07072.



DREMEL SHAPER/ROUTER TABLE

Dremel's new model Shaper/Router Table quickly converts the Moto-Tool into a bench-mounted wood shaper. The stationary-mount table lets do-it-yourselfers and hobbyists work with both hands to guide work pieces through intricate routing and shaping. It allows you to do professional-quality slotting, edge trimming, pilot-bit routing and sanding of irregular shapes. Uses include: wood trim edging and routing; wood joints such as laps, rabbets and dadoes; picture-frame molding; drum-sanding edges. A three-way adjustable fence is among the design innovations of the model 231. The adjustable swing fence uses a unique sliding wedge that provides support after the cut is made. A router bit guard includes a viewing cylinder so you can see the bit and workpiece. Screw adjustments accurately set depth settings as small as .010 inch. Its large 8x6-inch table has a molded, pre-drilled ledge, so a larger work surface can be added easily. All recent Moto-Tools can be used with the Shaper/Router Table. Three bushings are supplied to hold Moto-Tool models 245, 250, 270, 275, 280, 285, 370, 380, 395 and Freewheeler model 850.

For more information, contact Dremel, 4915 Twenty-First St., Racine, WI 53401.



CREATIVE FACTORY CLASSIC AIRCRAFT COLLECTOR CARDS

The Creative Factory's newest and most exciting product is the Classic Aircraft Collector Cards. The "base-ball cards" of aviation history, 48 are currently available in 6-, 12-, 18-, and 48-card packages. The picture sides of the cards show beautiful reproductions of meticulous paintings by noted aviation artist, Bob Hill. The realism and attention to detail make it seem as if the aircraft was photographed in mid flight. On the back of each card are the history and specs of the craft shown in the painting.

For more information, contact The Creative Factory, 2181 N.W. Glisan, Portland, OR 97210.



MOUCHA MODELS THE NOVI

The NOVI is a fully aerobatic low-wing sport aircraft with clean, smooth lines. It has a symmetrical airfoil, so it's capable of almost any maneuver. It's powered by a .40-.50 2-cycle, has four channels, a 60-inch wingspan, a fuselage length of 45 inches, a wing area of 690 square inches, and it weighs 5 1/4 pounds. The kit includes die-cut ribs, formers, lite-ply doublers and fuselage sides, pre-bent landing-gear wires, full-size rolled plans, a complete instruction book that shows the framework and the completed model, Mylar decals, and all necessary hardware, apart from hinges and pushrods. Wheel pants are optional.

For more information, contact Walt Moucha Models, P.O. Box 112, Menominee, MI 49858.



DRY RIDGE 1/4-SCALE SPACE- WALKER

Dry Ridge Models plans presents its most recent design, the 1/4-scale Spacewalker. Conventional built-up construction is used for lightness and strength. The one-piece wing has a wingspan of 78 inches, and an area of 1053 square inches, producing a wing loading of only 18.05 ounces/square foot. With a .46 2-cycle, its weight is 8.25 pounds, and slightly more with a .61 2-cycle. It's a good model with which to make the transition from high wing. Plans include two sets of spaceman logo decals and there's also a building manual. A glass cowl and wheel pants are available.

For more information, contact Dry Ridge Models, 59 McCurry Rd., Weaverville, NC 28787.



UNLIMITED MINI-I SLOPE GLIDER KIT

K&A Models Unlimited announces its new Mini-I Slope Glider Kit, designed by Ken Williams. The kit is available now, and features a wingspan of 28.5 inches and an area of 167.4 square inches. The flying weight is 9.5 to 10 ounces. The kit includes all machine-cut plywood and balsa parts, foam-core wings, plans and instructions, hardware package and pushrods. The Mini-I requires a mini 2-channel R/C system and is designed for the advanced builder and flier.

For more information, contact K&A Models Unlimited, 5990 California Ave., Long Beach, CA 90805.

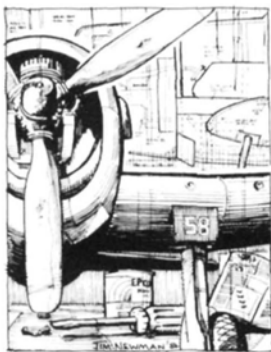


FUTABA 7-CHANNEL HELICOPTER SYSTEM

With the 7UHP 7-channel, PCM 1024 helicopter system, you have accurate computer control for ATV, dual rate, exponential and helicopter mixing requirements. Using data input keys, all programming settings are made in 1-percent increments and they are displayed on an LCD screen. The 7UHP also uses Futaba's exclusive PCM 1024 for the ultimate in servo resolution and response. Among the 7UHP's special R/C helicopter features are an invert switch, hover memory, pitch-mixing, idle-up and tail-rotor mixing. In addition to programming functions, the big LCD screen also provides information for servo reversing, PCM/PPM switching, transmitter battery voltage and elapsed time of operation. Everything you need to know for a perfect flight is there, in easy-to-read numbers, at the touch of a button. Even a low-battery warning signal is included. The stunning electronics of the 7UHP helicopter system are encased in an all-new transmitter case that has been designed for comfort and optimum control. Mix, rate and auxiliary channel controls are slanted to be reached easily and the length of the open gimbal control sticks is adjustable.

For more information, contact Futaba Corporation of America, 55 West Victoria St., Compton, CA 90220.

Descriptions of new products appearing in these pages were derived from press releases by the manufacturers and/or their advertising agencies. The information given here does not constitute endorsement by Model Airplane News, or guarantee product performance. When writing to the manufacturer about any product described here, be sure to mention that you read about it in Model Airplane News.



Sporty Scale Tech

by FRANK TIANO

WHILE BUILDING MY current airplane—a 1/5-scale Bell P-39 Airacobra—I realized that for any 80-inch (or so) model, there really isn't a wide choice of landing-gear units from which to choose. I'm fully aware that I could bend some coat hangers or spring for some 5/32-inch music wire down at Universal Hobbies, but I'm talking about going all out—you know, full house. Yeah, you got the picture: I'm looking for retractable landing gear.

Now, there are scads of companies making retractable landing-gear units. There are Rhom*, Spring Air*, B&D* and Goldberg* units, if you need something in sizes 6 to 12; and then there are Robart* units, if you're into the fuller sizes: 26 and up! The smaller stuff is ideal for most airplanes weighing up to 12 pounds or so, but after that, they really can't do the job. And it isn't because they aren't sufficiently well-made; it's simply because they aren't capable of carrying a scale-size strut and tire and usually don't have the power from their small air cylin-



Up front, below the gun deck of this beautiful FW-190, reside a pair of replica Rheinmetall MG131 13mm guns, which are available from J.D. Scale Models.

der to retract that kind of weight anyway. That leaves us with Robert J. Walker's giant-size units, which are successfully made by Robart, his company. The

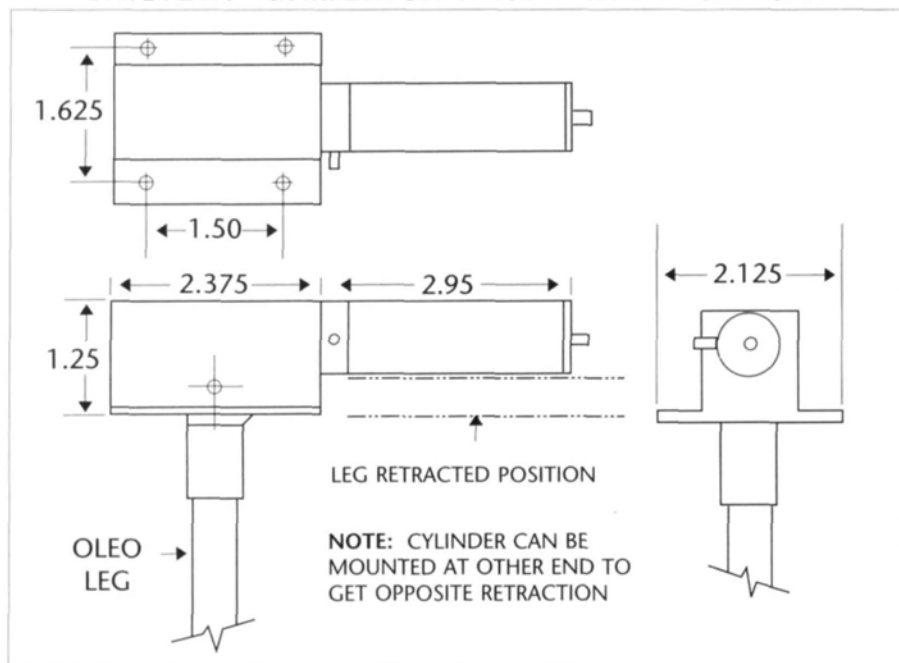


The Mustang cockpit was home to many WW II warriors like Yeager, Gentile, Blakeslee and others. Note detailing, including gun sight, oxygen regulator and hose.

trouble with these things is that, in an average 80-inch model, the top portion of the landing-gear units protrudes through the top of the wing skin, and this creates a considerable dilemma for the static judges. You see, 80-inch models just don't have the wing thickness to accept Robart's stuff, and this brings us to the realization that there's only one set of gear available to the 80-inch gang, and that's the set manufactured by my old buddy, David Platt*.

It's tough writing about a friend's merchandise, because some readers might feel that the friendship angle is the only reason I'm writing about the product. However, if we needed a 6.385294-inch spinner for a specific scale model and your buddy made such an animal, wouldn't you tell people about it? Well, I'm in the same situation. Dave Platt makes a set of retractable landing gear for models of approximately 70 inches and larger, and they're very well-made. These aren't to be confused with the nylon Platt units of cons ago. The new-generation gear are metal, and they'll handle any aircraft up to about 40 pounds. As you can see from

DAVE PLATT "COMPETITON SPECIAL" RETRACT GEAR UNIT



the diagram, they're relatively compact, yet their steel-and-aluminum construction renders them virtually unbreakable. He calls them the "competition plus" system. Best of all, in his handbook, Dave describes how to modify his gear to allow retraction angles of less than 90 degrees! You heard correctly! By adding a slight bit of J.B. weld to the chassis sides, you can prevent the slider bar from pushing the elbow block all the way home and thus produce a down-angle of less than 90 degrees, while retaining the solid lock for which Platt's gears are famous.

In addition to the regular 90-degree units that sell for \$219 for the complete two-gear system, Dave also offers a 110-degree set for \$229 and a 90-degree rotating set (for you Corsair and Skyraider freaks) for \$254. Spare units sell for 89 bucks for the 90-degree unit and \$94 for the 110-degree unit. To make any of the units steerable, just add \$15. Dave also sells landing-gear struts (two come with each system) and a very neat set of pre-drilled aluminum blanks that allow you to make your own scale-looking, lower landing-gear forks like the pros use. The holes for the strut and axles are already in there, so you only have to cut the shape on a band saw, round the corners with a Dremel tool, and you're in business. For his catalog of Scale Aircraft and Accessories, just send \$1 to Dave Platt Models.

Now that we have the gear up and out of the way, I'd like to introduce you to another Floridian: John (Jack) Dorman who lives in Fort Walton Beach, FL, close to the Alabama border. Besides being an ex-fighter jock in WW II, Jack has been a serious scale competitor and judge for many years. In fact, he's the head judge for the Top Gun event in April. Jack's company, J.D. Scale Models*, produces some of the finest cockpit kits for 80-inch birds that you've ever laid eyes on. These are first-class kits featuring cast-resin parts with intricate detail, not at all like the poorly pulled vacu-formed plastic knock-offs that are floating around.

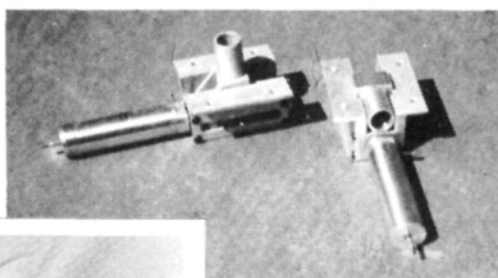
The plastic parts Jack provides are



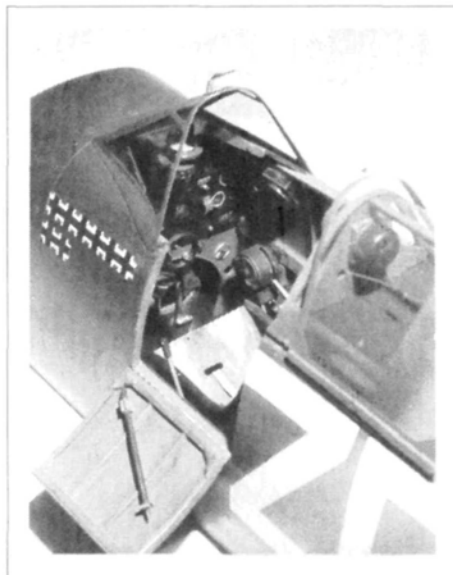
Side opening canopy of "Gustav" variant of Bf-109 encloses fully detailed cockpit, including stirrup-type rudder/brake pedals.

crisp and clean for one reason only: They're pulled from *his* master molds. I know someone who bought Jack's cockpit kits for a few subjects and then pulled his own kits from Jack's parts, but the difference is like night and day. Anyway, as you can see from the photos, with a little sandpaper and paint, the kits can be made into very realistic-looking interiors! Right now, they're available for a 1/5-scale Spitfire, ME-109, FW-190, P-51 (B or D), Zero and Jungmeister. An outstanding gun kit and bomb rack are also available for the Focke Wulf. The professional cockpit kits retail for \$40, the gun kit is \$30, and the ETC 501 Centerline Rack Kit is \$15. Send an SASE to Jack to receive a little flyer describing everything.

Last, but not least, I'd like to start a scale modelers' want list. This list will include anything and everything that we'd like to have to make our modeling life easier or more enjoyable. This list could include things that make our creations look a little better, too, and maybe, if enough companies read our list and realize that there's a market for these items, we might see answers to our prayers. Here are just a few that I've thought of:



Above: Just the ticket for the "intermediate"-size scale model, the Dave Platt retract units have been redesigned and are now much "beefier" than the previous system.



Cockpit kits, like this one for the Spitfire, add tremendous realism to any Warbird. Notice the emergency egress axe stowed inside the hinged panel.

- a book of *real* color chips for every country that ever produced an airplane
- model-airplane tires larger than 4 inches that *look* like real airplane tires, have a cross-section somewhat narrower than a Big Mac, don't have the model manufacturers name on the side wall and hold air longer than overnight
- balsa wood that *doesn't* put chips in the blade of my new razor plane
- a scale model magazine that has captions with the pictures
- aluminum hunks, chunks and bars for those of us who like or need to make metal parts for our models
- lightweight pilots that don't look like some hermaphrodite
- scale engine kits for WW II birds
- an in-line engine like the Russkies used at the World Champs, only with a displacement of 1.5 cubic inches

HELICOPTERS!

Coming in the July issue of *Model Airplane News*, an- all new expanded R/C Heli section!

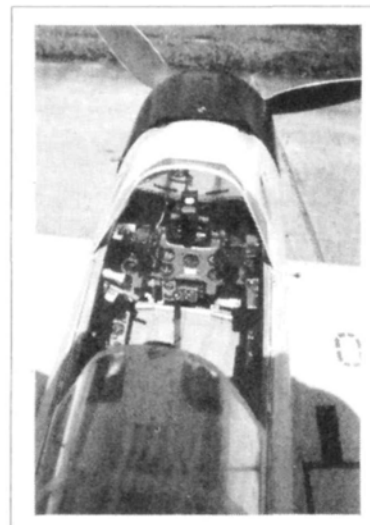


Starting with the July issue, as part of our overall plan to provide our loyal readers with an even better R/C magazine, we'll be adding pages to *MAN* that focus specifically on R/C helicopter activities. Craig Hath's existing column, "Helicopter Challenge," will be joined by a variety of other heli subjects, including product reviews, and technique and "how-to" articles prepared by recognized heli builders and fliers. We're sure that this added section will contain material that will prove to be of great value to both newcomers and experienced heli fliers.

Remember: the July issue! Bigger magazine, dedicated heli section and no change in cover price. The value just got better. **Watch for it!**

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- a one-part epoxy paint that doesn't smell, isn't expensive and dries in 30 minutes.



A 1/5-scale miniature version of Saburo Sakai would find this Mitsubishi Zero cockpit as complete and accurate as the full-size one he flew.

That should get you started. If you have any other ideas, send them to me and I'll send the information to the proper type of manufacturer.

Until next month, remember the two most important things about scale modeling: Never give a match to an irate guy with a flame thrower, and check your six!

**Here are the addresses of the companies mentioned in this article:*

Rhom-Air Products, 924 65th St., Brooklyn, NY 11219.

Spring Air Products, P.O. Box 36-1312, Melbourne, FL 32936.

Carl Goldberg Models, 4734 W. Chicago Ave., Chicago, IL 60651.

B&D Enterprises, Rte. 1, Box 7, Ballard, WV 24918.

Robart Manufacturing, 310 N. 5th St., St. Charles, IL 60174.

Dave Platt Models, 6951 N.W. 15th St., Plantation, FL 33313.

J. D. Scale Models, 317 Jonquil Ave., Ft. Walton Beach, FL 32548. ■

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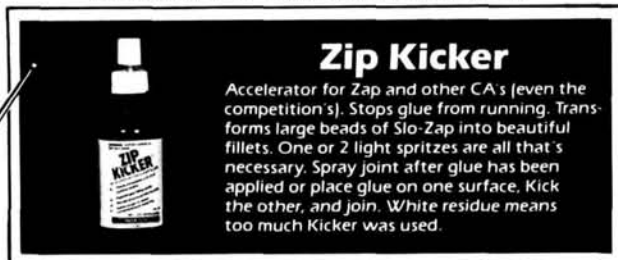
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Pacer Tech, Campbell CA

ARF ASSEMBLY

(Continued from page 89)

have to use tape. A little quick-dry agent might also help here, but I haven't tried it, so be careful.

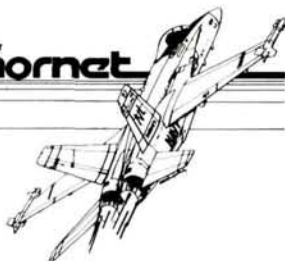
Everywhere!

Check the factory glue joints anywhere you can see them, especially around the wing hold-downs and fire wall in the fuselage. If you aren't satisfied with the way the joints look, put some glue on them. This is another good place to use silicone adhesive—it sticks, but it won't attack the foam. It's heavy though, so use only just as much as you need.

Control-surface hinges on ARFs have been responsible for lots of lost planes, but there's a way to pin them that doesn't destroy the plane's appearance. Drill your holes in the bottom of the control surface, but be careful not to penetrate the covering on the top side of the surface. There will be holes for the pins in the bottom, but the top of the plane will look great. When you've installed the pins, you can touch-up the holes with a little fuelproof paint. (I've even used nail polish when I didn't have any of the right color of paint around.) This doesn't work for the rud-

(Continued on page 102)

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VISA



ARF ASSEMBLY

(Continued from page 100)

der, of course. If you poke holes in one side, they will show a little, even after touching them up.

Finally, check for potential problems before you put the model together. If you're new to the hobby, let an experienced builder look your airplane over, and send it back to the manufacturer if you find something that absolutely *isn't* right.

We all have a tendency to place most of the responsibility for an ARF on manufacturers, and that's the way it should be, because they do advertise ARFs as being almost ready to fly. However, innovation means coming up with a new product and then working to improve it. For example, much of the improvement in computer software is a result of customer input. If we accept the responsibility for putting the model together as well as we can—even if it means touching up areas that should be right when we get it—when something does go wrong, we can help the manufacturers by letting them know about an engineering deficiency or a weakness in materials. Modeling is one of the few industries in which I've been involved where

(Continued on page 104)



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ARF ASSEMBLY

(Continued from page 102)

both companies and consumers understand that they must work *together* to produce better models and equipment. So take some pride in your ARF. Put it together so that it will stay together, and enjoy!

**Here are the addresses that are pertinent to this article:*

Carl Goldberg Models, Inc., 4734 West Chicago Ave., Chicago, IL 60651.

MonoKote; distributed by Top Flite Models, 22635 S. Wabash Ave., Chicago, IL 60616.

Satellite City, P.O. Box 836, Simi, CA 93062. ■

BUILDING AIRPLANES

(Continued from page 51)

down to any size, usually without charge.

The Rocket City* folks make the best accessory I've ever seen for pinning model airplane parts during assembly. Called Pin Clamps, they're so handy that I use them all the time now, and I wish they'd been available long ago. They're little, round, black plastic discs, with a small hub containing a central hole that fits snugly on the shaft of a T-pin. In use, you stick the clamp-equipped T-pin where you want it; then push the disc down against the balsa part to hold it firmly in place on the board (or fuselage side, etc.). Pin clamps come 28 to a package and are quite inexpensive. If your local hobby shop doesn't carry them, you can get them by mail from Ace R/C* and probably most other mail-order suppliers.

We all know that while building wings and similar structures over model plans, protective material (e.g., wax paper) is needed between the wood and the plan to keep them from getting glued together. But it isn't well-known that some of the many glues used in modeling react adversely with the commonly used separating materials. *Don't* use waxpaper under any framework being assembled with "model airplane cement," because its solvents dissolve some of the wax into the glue, and that prevents it from ever drying properly and attaining full bonding strength. The same goes for daubing candle wax or soap on a model plan—both rather sloppy practices anyway.

Saran Wrap works beautifully as a protective film for model-building, as long as you aren't using CA adhesives. With CA, use wax paper. However, the best all-around anti-glue film is probably the plastic sheet used as backing on iron-on covering material. I know of no model ce-

(Continued on page 108)

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Prof. Sticky VonShtuck



Z-7 Debonder

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BONUS!!!
Two stands including this one that attaches to iron so you don't have to look for it

BUILDING AIRPLANES

(Continued from page 104)

ment that will stick to it.

With the wing parts accurately precut, the plan taped down smoothly to a flat, easily pinned surface and covered with protective film, wing assembly will be fast and easy. I dry-assemble the wing

frame (one panel at a time, of course), then apply a tiny drop of thin CA at the top of every joint. I then remove the pins, lift the wing off the plan, and re-glue each juncture with more thin CA. I use enough to see about 1/16 inch of "wet" area along-side each joint. That way, I know the glue has penetrated the wood deeply enough to give a strong, well-anchored bond.

*Here are the addresses of the companies mentioned in this article:

Cox Hobbies, Inc., 1525 East Warner Ave., Santa Ana, CA 92705.

Ace R/C, Inc., 116 W. 19th St., Box 511C, Higginsville, MO 64037.

Rocket City Specialties, 103 Wholesale Ave. NE, Huntsville, AL 35811.

FLOATING AROUND

(Continued from page 56)

adaptable to all his designs. Wendell's a fellow float flier who's making a great contribution to our sport. Check it out.

Rogue's Gallery

We have three new members in our club: Gordon Wheeler, Bob Wakerly and Gary Stanton showed up at the lake recently with three planes never before featured in "Floating Around." Gary Stanton's plane is a Dalotel from Zimpro Marketing* in Oak Ridge, TN. The 40-inch built-up floats are from Circus Hobbies* and the 71-inch-span model is powered by an O.S.* Max 90 breathing out of a Hatori tuned pipe and header. The Dalotel runs flat in the 80s and might even break 90 in a screaming dive from way up there. The plane is exciting; I haven't flown it, but Gary and his son Rick can really do the Dalotel justice. Despite its speed, one of the nicest attributes of the Dalotel is its ability to perform aerobatics at both ends of the speed envelope; my favorite is a slow snap about 20 feet off the water.

The Dalotel is covered with yellow and white Ultracote*, with glass-cloth on the floats. The Circus floats have a severely tapered stern, which buries the float rear at rest; but on the other hand, this plane doesn't rest much. If you look closely at

(Continued on page 111)

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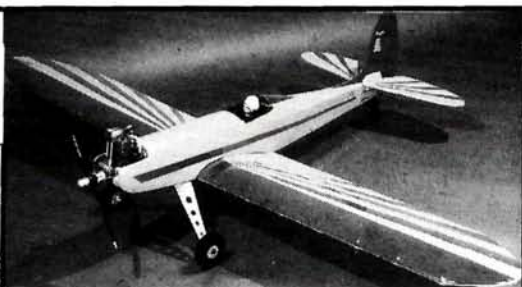
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FLOATING AROUND

(Continued from page 108)

he bank shot, you'll notice how Gary dropped a rudder post from the fuselage to intersect with the rear strut (the single rudder works well in that forward position). This plane/float/engine combo is so slick that you can see the torque twisting the Dalotel when it's accelerating on step.

Bob Wakerly's Ace* Seamaster 40 is smooth, sanitary, powered by a K&B* Sportster 40 and runs with a Futaba* radio. The color scheme is red and white MonoKote* with a couple of nice decals. Like the North Star, there are some minor modifications popping up on the Seamaster. After talking to a few other Seamaster fliers, Bob set his up with the engine and stab at 0 degrees and the wing at 1 degree. Bob thinks the changes haven't affected performance, and his rolls are more axial. Ken Willard's hull design on the Seamaster produces beautiful step runs, and the takeoff can be almost imperceptible on smooth water. Now, I ask you land-bound people out there: When did you ever see a takeoff like this at the local strip?

Gordon Wheeler is a surgeon and was on call the day I shot his old-timer. He disappeared before I could get notes on the plane for this issue, and I tried to call him, but this guy is *busy*! (I might have had more luck calling *George Bush*!) Anyway, Gordon's plane might be a Pacific Ace with a 40-inch wingspan. It's powered by some kind of a geared .05 electric with 6 cells running through a speed control. The plane is a delight to watch: On a calm day, it can pick its way around in the air with a grace, deftness and agility you have to see to believe. Gordon cut the floats from foam and covered them with 3/4-ounce cloth and a thin coat of epoxy. When you pick it up, the plane seems to be weightless.

This is a *great* little ship. I watched Gordon follow a couple of ducks on the water: He'd taxi up to them and shut down; the ducks would look at the plane and paddle away, whereupon Gordon would start up and silently follow them. I won't reveal the rest of this exciting tale, because I'm not supposed to upstage Uravitch or Chianelli, but I can tell you that the ducks weren't destroyed, and the story had a *happy* ending.

Float Meets '89

As the year progresses, I'll list whatever float meets I can as *soon* as I can. I know of three right now, and I'll give them to you in order of appearance.

- The annual Clearlake Meet at Lakeport, CA, on May 12, 13 and 14. Clearlake needs no introduction to those of you who read our yearly coverage of the event, but for newcomers, just let me say that this meet turns Lakeport into what seems like a city populated entirely by floatplane enthusiasts! This one is big and truly a classic. For more information, contact Ray Carmen at (707) 994-2219, or Art Young at (707) 998-1224.

- The Second Annual Mid-America Family Float Fly Festival at Higginsville, MO, on June 3 and 4. Its first year out, this event swamped the competition in terms of numbers, and this year's promises to be even bigger. They'll have to brace the transmitter-impound table with 2x4s! The Mid-America is sponsored by Ace Radio Control, Inc. For an info pack, write to Ace R/C Float Fly '89, 116 W. 19th St., Box 511, Higginsville, MO 64037, or phone (816) 584-7121.

- The first giant-scale reenactment of the Schneider Cup Race at the Nautical Inn on Lake Havasu, NV, on November 10, 11 and 12. I just received the second issue of Bob Martin's Schneider Cup News with a picture of Bob Jones's 1/3-scale Curtiss R3C-2 Racer in the framed-up stage. The thought of seeing dozens of these giant floatplanes, all bent on being the best, in one place already has me chewing the edge of my desk! Don't miss this meet if you can help it; it promises to be a meet of national, and perhaps even international prominence. Bob Martin, the event chairman, is getting carried away just as I am. He explains: "Forgive me, but with the letters and phone calls I receive, it's difficult to maintain an attitude short of hyper!" Contact Bob at 1520 "C" Acoma Lane, Lake Havasu City, AZ 86403, or phone (602) 855-6900.

That's it for this month. We'll be back in a couple to whet your imagination with more floatplanes.

*Here are the addresses of the companies mentioned in this article:

John Sullivan Model Floatplane Products, 1421 Second St., Calistoga, CA 94515.

Wendell Hosteler's Plans, 1041 Heatherwood Lane, Orrville, OH 44667.

Circus Hobbies, 3121 S. Highland Dr., Las Vegas, NV 89109.

Zimpro Marketing, P.O. Box 3076, Oak Ridge, TN 37830.

O.S.; distributed by Great Planes Model Distributors, P.O. Box 4021, Champaign, IL 61820.

Ultracote; distributed by Carl Goldberg Models, Inc., 4734 West Chicago Ave., Chicago, IL 60651.

Ace R/C, Inc., 116 W. 19th St., Box 511C, Higginsville, MO 64037.

K&B Manufacturing, 12152 Woodruffe Ave., Downey, CA 90241.

Futaba Industries, 555 W. Victoria St., Compton, CA 90220.

MonoKote; distributed by Top Flite Models, 2635 S. Wabash Ave., Chicago, IL 60616. ■

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SCALE DOCUMENTATION: Plan Enlarging. Photo packs, 3-view drawings for 1,600 aircraft. Super-scale R/C plans for Giant, Sport. 60-page catalog \$4. Scale Plans and Photo Service, 3209 Madison Ave., Greensboro, NC 27403; (919) 292-5239.

PLANS ENLARGED, Large Scale Specialists. PC Model Software. Free catalog. Concept, P.O. Box 669E, Poway, CA 92064; (619) 486-2464.

WANTED: Berkeley and Cleveland kits or related items: parts, plans, boxes, brochures, books, ads, radio equipment, accessories, etc. Gordon Blume, 4649-191st Ave. S.E., Issaquah, WA 98027.

GIANT SCALE PLANS by Hostetler. We fly what we draw. Send SASE to Wendell Hostetler's Plans, 1041 B Heatherwood, Orrville, OH 44667.

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MAKE A BEERCAN BIPLANE, 9 inches with 14-inch wingspan, \$9.95. Kit Three, Box 72104, Marietta, GA 30007.

ENGINES: IGNITION, GLOW, Collectors, runners, used, new. Sell, trade, buy. SASE for list. Rob Eierman, 504 Las Posas, Ridgecrest, CA 93555; (619) 375-5537.

ALL ALUMINUM P-51D Mustang and P-51B Mustang III Precision 1/4 replica scale R/C kit. Extraordinary museum detail and a thrill to fly! All aluminum chemically milled and cut-out/drilled/formed—ready for assembly. Thirty-six sold to date. Complete kit \$3000. (Less engine & radio.) Sample rib section and details \$25 or SASE for info. Warbirds Aviation, 122 Naubuc Ave., (NAP Bldg.), Glastonbury, CT 06033. (203) 657-3595.

OLD TIMERS, take a ride back in time to airplane modeling roots with this vintage book—*Gas Models*. A true collector's book from the early editors of *Model Airplane News*. It contains the best of modeling from the '30s and '40s, including great technical information and classic construction articles from the Golden Age period. \$7.95, add \$1.75 S&H; Foreign Surface Mail, add \$2.75; Foreign Airmail, \$5.50; Payment must be made in U.S. funds drawn on a U.S. bank or by an International Money Order. Air Age Mail-Order Service, 251 Danbury Rd., Wilton, CT 06897.

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DISCOURAGED BY TOO-FAST R/C TRAINERS? Ease-of-flying ratings of over 30 popular trainers, \$2. Jim Waterman, 3818 Deerfield Dr., San Antonio, TX 78218.

ENGINE VIBRATION ISOLATOR MOUNTS. Four rubber mounts with 10-24 socket head bolts \$6.50. Penrod Products, Box 13051, Arlington, TX 76094-0051.

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Send ad and payment to *Model Airplane News*, 251 Danbury Rd., Wilton, CT 06897. **Non-Commercial classified ads** (commercial ads of any kind not accepted at this special rate). Rate: 15 words or less, \$4.50 payable in advance. No charge for name and address. Additional words, 25¢ each. **Commercial classified ads** (rate applies to anyone selling on a commercial basis—retailers, manufacturers, etc.) Rate: 50¢ per word, payable in advance. Count all initials, numbers, name, address, city and state, zip and phone number. **Closing Date** for either type of ad is the 20th of the third preceding month (for example, January 20th for the April issue.) We do not furnish box numbers. If you would like your ad run in more than one issue, multiply amount of payment by number of months that ad is to run. It is not our policy to send sample copies of tear sheets.

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EMBROIDERED EMBLEMS, Enameled Pins, Your Design, Excellent Quality, Free Booklet, A.T. Patch Co., Dept 68, P.O. Box 682, Littleton, NH 03561, (603) 444-3423.

WANTED: RTF U/C planes and U/C race cars, mite cars; complete or pieces, with or without engines. Buy or trade. John Fietze, Box 1521, Amagansett, NY 11930.

USED AVIATION BOOKS. Free catalog. Want lists welcome. Dan F. Webb Books, Box 6366MAN, Moraga, CA 94570.

MODEL MAGAZINES SALE: 1949+ *Air Trails*, *American Aircraft Modeler*, *Model Airplane News*, *R/C Modeler*, *Flying Models*, *Model Aircraft*, SASE. Milton Sheppard, 670 Concord Rd., Glen Mills, PA 19342.

WANTED: Revell plastic model kit of "Visible Radial Aircraft Engine." Call or write: Richard Tabler, 24 Thorndike St., Arlington, MA 02174, (617) 641-1089.

WANTED: Model engines and race cars before 1950. Don Blackburn, P.O. Box 15143, Amarillo, TX 79105, (806) 622-1657.

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FOR SALE: *Model Airplane News*, 1949-1977; also *Aircraft Modeler*, *Aero Modeler*. List available. Bill O'Berry, 411 Ben Oaks Dr. West, Severna Park, MD 21146.

25 DIFFERENT PAPER AIRPLANES, \$5 postage paid. Folded Flight & Kite, Box 41, Santa, ID 83866.

ENGINE VIBRATION ISOLATOR MOUNTS. Four rubber mounts with 10-24 socket head bolts. \$6.50. Penrod Products, Box 13051, Arlington, TX 76094-0051.

R/C MAGAZINE INDEX—Third Edition. Valuable Informative Time-saving Reference Guide. \$9.95 pp. Roamin' Research, Box 104, Yale, MI 48097.



FOR THE R/C BOAT ENTHUSIAST
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FALL FLY-IN

(Continued from page 61)

flew towards each other at top speed and went into a knife-edge flight as they passed each other.

For a change of pace, the next flight was for the kids. The show team flew a full-size witch on a broom, and the crowd loved it.

The final routine was performed by Don Muddiman and his Flying Machine. With this airplane, he did maneuvers that haven't even been named yet. In his last maneuver, which should have been called "Deathwish," he took his Flying Machine up to about 800 or 900 feet, killed the engine, put the airplane into a terminal velocity dive, pulled out at about 10 feet above the ground, did a 180-degree turn and landed dead-stick at his feet. Awesome, to say the least.

The next air-show act was by Bob Fiorenze, master scale-model builder and winner of the '88 Scale Masters with his beautiful F-18 Hornet (which was on display). Bob flew his beautiful Jet Model Products F-4 Phantom with style and finesse. This jet model's flights were flawless; loops, four-point rolls, tight turns,

(Continued on page 119)

FALL FLY-IN

(Continued from page 114)

inverted flight (3 or 4 feet above the ground) and vertical rolling climbs were performed with ease. The crowd roared with cheers and applause.

Bob Violett of Bob Violett Models had his F-86 Jet on display—a really beautiful and highly detailed model airplane. I've seen it fly and it flies really well. Bob also put on an excellent flight performance and dazzled the crowd with his high-performance sport jet, the Viper, which flew at high speeds in excess of 178mph. With flaps down, this airplane can also slow down to approximately 38mph, and it's still very stable. But the true grit of this airplane is seen in its high-speed performance.

Cliff Hiatt flew his X-Cell helicopter and put on quite a show. He flew his machine as if it were a pattern airplane doing loops, rolls, avalanches and inverted hovering to within a few inches above the ground. He followed this with a realistic autorotation and landing. Again, the crowd loved Cliff's performance.

During the air show, Jim Losie used his 10-foot modified Telemaster to tow a banner that said "Happiness is Flying an R/C Model." The banner was designed by Jim and made by his wife.

We also had the pleasure of having Dr. Walt Good attend our fly-in. Dr. Good is one of the original pioneers in R/C modeling and he also gave us a demonstration

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flight with his glider, the Gutsy Lady. You "old timers" might remember the classic R/C Guff. It's now on display in the Smithsonian Air and Space Museum. Dr. Good still has the touch.

Mike Kestner took Best of Show with a giant-size P-38, which was powered by two Sachs 2.1-cubic-inch engines. It had retracts, flew with three-bladed props, had a wingspan of 11 feet, and weighed 45 pounds. It was a work of art and flew extremely well. Don Muddiman flew the P-38 in a demonstration dog fight against Phil Corso's Byron Zero. Both planes looked great in the air.

Well! That's it radio fans; next year will be bigger and better. Keep 'em flyin'! ■

PATTERN MATTERS

(Continued from page 63)

and depending on what kind of plane it's hauling around, might not even be noticeable. The bottom line is that a private citizen succeeded in designing a low-cost, effective noise-reduction device, which yielded a 90dB output on a 10-7 prop—all without the help of the industry. Hooray for Fred and the Weedwackers for this info!

Till next time: fly.

**Here are the addresses of the companies mentioned in this article:*

Golden Gate Hobbies, P.O. Box 123, San Bruno, CA 94066.

Chevron Hobby Products, P.O. Box 2480, Sandusky, OH 44870.

Satellite City, P.O. Box 836, Simi, CA 93062. ■

CHARLES M. KENNEY

1928-1989



At the risk of sounding trite when it's the least correct time, it is truly with the deepest regret that we report the passing of one of our most popular contributors, Charlie Kenney. Charlie's views and wisdom occupied the pages of MAN for many years in a variety of areas. Technical things and, especially, electronic systems captured his interest—a logical spin-off of his full-time occupation at the avionics end of the aerospace business.

Charlie thoroughly enjoyed the hobby, as evidenced by the seemingly endless stream of material he regularly provided to this office. Equally at home with electric-powered models

or the snarling aerobatic types, Charlie shared as much as he possibly could with anyone who sought his help. Needless to say, the pages of MAN won't be quite as bright in his absence.

To his many friends and loved ones: our sincerest and heartfelt sympathy; we count ourselves among the lucky to have known him.

To Charlie: The view from your present "Control Tower" is the best there is; enjoy it forever.

RAU

NAME THE PLANE CONTEST

CAN YOU IDENTIFY THIS AIRCRAFT?

If so, send your answer to **Model Airplane News**, Name the Plane Contest (state issue in which plane appeared), 251 Danbury Rd., Wilton, CT 06897.



Congratulations to Erik Berglund of Sherwood, OR, for correctly identifying the Vertol (formerly Piasecki) H-21 Work Horse helicopter as our March mystery airplane. Eleven-year-old Erik's entry was chosen from the 66 correct answers received! As two of you pointed out, we might have made this one *too* easy!

An outgrowth of the HRP-1 (the first, large, tandem-rotored helicopter to see production), the H-21 series was developed to provide both the U.S. Army and the Air Force with an air-rescue vehicle capable of carrying a large number of troops or stretcher cases.



Nicknamed the "Flying Banana," the H-21 grew in power from the 1150hp of the original to the twin G.E.T-58 gas turbines of the "D" version.

These provided a combined shp in the 1700-1900 range, which added tremendously to the lift capability. The rotor's diameter was 44 feet, and the empty weight was 8,800 pounds. Among the unique features incorporated into the H-21 were a boom-type hydraulic hoist that allowed additional payloads to be carried externally, and the ability of

each wheel to be fitted with an inflatable ring float to permit landing on water and marsh.

The winner will be drawn four weeks following publication from correct answers received by postcard delivered by U.S. Mail and will receive a free one-year subscription to **Model Airplane News**. If already a subscriber, the winner will receive a free one-year extension of his subscription.

CHIPMUNK

(Continued from page 69)

applied the remainder of the supplied "decorations."

PERFORMANCE: When it comes to flying, this little "sparky" does a pretty decent job. No question about its performance, and it's surely no trainer! It's very aerobatic and the throttle capability really does add an additional dimension to the electrics. The Chipmunk takes off easily from prepared surfaces, like blacktop runways, but we couldn't get it to do the same thing off even relatively close-cut grass. It trimmed out immediately, and we thought the CG could afford to be a little further aft than we had it. On the fourth landing, we landed a little short (and probably a bit hard) on the grass, and this resulted in both the gear struts bending aft. One side was fixed by re-bending the wire forward, the other broke the landing-gear trunnion in the wing, and this required corrective surgery. After going inside, I

found that this area could stand modification, if not re-design. I beefed up mine with a little additional lite-ply and some thin carbon fiber strips that seem to be working well.

Now, with about 15 flights on the Chipmunk, it continues to impress those who are seeing a performing electric for the first time. One aspect of electric flying that does take a bit of getting used to, and I've mentioned this before, is the eerie quietness and lack of audio "cues" that gas fliers are used to, e.g., the engine unloading when the airplane is accelerating in a dive. I'm sure it's still happening; you just can't hear it.

The Hirobo/Futaba Chipmunk does represent a step forward for electric flight. It delivers good performance that makes it a fun airplane to fly nearly anywhere. Like any other small, lightweight airplane, the Chipmunk flies best in calm conditions, but it doesn't just float around, it flies! If repairs are required, it's probably best to order replacement parts from

Futaba. A complete parts inventory is reportedly available. If you like small airplanes that are quiet, yet responsive, give the Chipmunk a look; it's definitely a step in the right direction.

**Here's the address of the company featured in this article:*

Futaba, 555 W. Victoria St., Compton, CA 90220.

HELI CHALLENGE

(Continued from page 93)

flybar lock for the X-Cell (No. 0505).

The first thing I noticed as unique about the Universal Pitch Gauge is that the range on the measuring scale allows for a full 15 degrees in both directions. Some of the other pitch gauges available only allow for around 10 degrees of positive pitch and 5 degrees of negative. Since many of us are now setting up our machines with pitch throws that total over 20 degrees, it's nice to see that someone has

(Continued on page 130)

HELI CHALLENGE

(Continued from page 122)

responded with a tool to accommodate this practice. The Universal Pitch Gauge can also be used to accurately set the flybar paddles, so ensuring that the pitch of the paddles matches the angle of throw of the swash plate, and that both paddles are perfectly matched to each other. This is the easiest pitch gauge I've found to use to date, because it's designed so that the scale can be adjusted with one hand while you steady the rotor head with the other

hand. This allows you to concentrate on sighting down the rotor blades without having to stop to make pitch-gauge adjustments. The Universal Pitch Gauge should be in stock at your local hobby dealer. If not, contact Miniature Aircraft USA.

• The new Kalt* tool kit.

This kit has practically every tool you'll need to build and maintain Kalt, or almost any other brand of helicopter. The set includes four metric Allen drivers (1.5, 2.0, 2.5 and 3.0mm), a combination open-end wrench (5.5 and 7mm), a 4-way socket

wrench (4, 5, 5.5 and 6mm), a 7mm nu driver, a Kalt universal-link driver, a Kalt universal-link remover, a glow-plug socket wrench with handle, needle-nose pliers and four, metric, Allen wrenches (1.5, 2.0, 2.5 and 3.0mm). All this comes in an injection blow-molded carrying case, the interior of which is lined with foam that's cut to hold each tool. This is a handy way to ensure that you have the right tool for the job at home, or away from your shop. The quality of the tools in the set appears to be very good; all seem to be hardened and intended for long-term use. If you've been shopping for tools of this nature you'll know that some aren't easy to find, and that often, if you do find one, the quality is poor. It seems that metric-size tools are becoming more readily available, yet some of the specialty items aren't common on U.S. suppliers' shelves. The Kalt tool set is available from Hobby Dynamics Distributors, and they should be available from your local hobby dealer.

That wraps it up for this month; next month we'll dive into loop (so to speak!). See you then.

*Here are the addresses of the companies mentioned in this article:

Miniature Aircraft USA, 2324 N. Orange Blossom Trail, Orlando, FL 32804.

Kalt; distributed by **Hobby Dynamics**, P.O. Box 3728, Champaign, IL 61821.

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